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And yet what is happening? Definitely, the financial crisis continues despite the efforts to mitigate or recovery of the EU policies.

The commencement of this spring supplemented with another difficult moment the issue regarding the debt crisis within the eurozone. Together with the Cyprus crisis, Europe is at a crossroads, questioning whether to continue or to stop the financial aid as done for Greece. Affected and irritated due to the blockings in the banking system, the large depositors are relocating their accounts, with discretion, in other tax havens hoping to benefit from a flexible but more robust regime. In this context, the financial services suggested alternatives regarding the orientation towards a veiled investment opportunity, which will save them from the persistent scrutiny of tax authorities.

Within this decision making assembly aiming, on the one hand to the rehabilitation of the financial banking system, and on the other to the compliance with the preconditions set by the agreement undertook by the eurozone governments, a new phenomenon is enhanced, particular and not specific to a national financial banking market: the regional ethnic competition from a financial perspective.

What is it about: the northern part of the country financially managed by the Turkish zone, which is not under crisis, launches attractive offers to the depositors from the southern area, financially banking managed by the Greeks that are in crisis. It is understood, thus, that in the same country the financial banking system expresses substantially different realities depending on the managerial style required by the attractiveness reason of the offer of services granted by the financial and banking institutions to the major equities coming from abroad.

The direct consequences of this situation materialize in increased unemployment, together with the banking sector activity narrowing, which is already under a recession period.

The economic conjuncture is likely to alarm again the European economic opinion, and not only.

What is the meaning of this entire controversial picture? At a first glance, it is clear that the aim is a significant reduction of the role and influence of the banking system, and of the offer of financial services at a macroeconomic level. Who will benefit? Maybe the entire reformation process of the financial-banking system, maybe the state’s interests to charge the large
equity deposits in order to cover their perpetual deficits or..... perhaps the tax heavens competitors.

Reality shall confirm one of the possibilities. Until then, the crisis continues.

Editor-in-Chief
Professor Mariana Iovițu, Ph. D.
Information technology (IT) emerges as an essential asset of modern firms’ competitive advantage, because it connects all business functions and supports managerial decision processes - both essential conditions for the attainment of the organization agility level. However, many modern firms experience difficulties on attaining its competitive edge, mainly because of a deficient IT-Business managerial role that, either deliberately or involuntarily, ignores the moderating effects of human factors - social determinants that are common elements to all hierarchy levels, of every business unit, within any modern firm. This work emphasizes the importance studying the IT-Business management function, as the organization's main trigger for the attainment of the IT-Business Competitive Advantage, through an appropriate management of the moderating effects of human factors. This research paper also proposes a business conceptual model - “The Five-Level Triad of IT-Business Competitive Advantage” - which predicts the achievement of a modern firm IT-Business Competitive Advantage, through the advancement of five progress levels - IT-Business Managerial Role Efficiency, Employee Alignment, IT-Business Alignment, IT Effectiveness, and Firm’s Agility. The rationale of the model is supplemented by the referenced literature and the application of a measuring instrument, which assists in the examination of the alignment maturity level, between IT and Business organizational objectives. The model acts as a guide to any modern firm IT-Business managerial function, which aims for the successful design of an effective IT strategy, on the road to the conquering of the IT-Business competitive advantage.
**Keywords:** IT-business alignment, IT Effectiveness, human factors, strategic management, IT-Business Competitive Advantage,

**Introduction**

Although the objective of any Information Technology (IT) business unit is the enhancement of modern firm’s performance - through the improvement of the quality of managerial decisions - in the absence of an adequate alignment between IT and Business objectives, the attainment of the firm’s agility status is jeopardized, and consequently, the chances of achieving the IT-Business competitive advantage are reduced. Managerial decisions are essential judgments for the development and implementation of business strategies, and as suggested by the literature review presented herein, an underperforming IT-Business managerial role, indeed fails on the task of efficiently managing the moderating effects of human factors, acting as an inhibitor of the alignment between IT and Business objectives, and jeopardizing the firm’s overall performance toward the attainment of its IT-Business competitive edge.

Human factors are social determinants with dual nature - enablers or inhibitors of modern firms’ technological objectives – that produce main challenges to the IT-Business managerial role, which shall execute timely and efficient management decisions, on the way to achieve the firm’s ultimate objective, the IT-Business competitive advantage. Since social determinants are common elements to all hierarchy levels, of every business unit, within any modern firm, it is vital its adequate addressing by the management function, as a fundamental and initial strategy toward an efficient managerial role. The procrastination of many IT-Business managerial functions, either deliberately or involuntarily, toward the potential and real effects of human factors, leaves to the fortune the fulfillment of technological objectives and the achievement of the firm IT-Business competitive advantage. The paper highlights the relevance of the IT-Business management function in addressing, on a timely and efficient basis, the moderating effects of human factors, on the pursuit of the firm’s IT-Business competitive advantage.

This work presents a business conceptual model, “The Five-Level Triad of IT-Business Competitive Advantage”, which predicts the achievement of IT-Business Competitive Advantage in modern firms, through the advancement of five progress levels - IT-Business Managerial Role Efficiency,
Employee Alignment, IT-Business Alignment, IT Effectiveness, and Firm’s Agility. The rationale of the model is supplemented by the referenced literature as well as the application of an alignment measuring instrument, which assists in the examination of the alignment maturity level, between IT and Business organizational objectives. The model acts as a guide to a modern firm IT-Business managerial function, which aims for the successful design of an effective IT strategy, on the road to conquering the IT-Business competitive advantage. This work considers whether the act of modeling the moderating effects of human factors - by the IT-Business managerial role - is the right approach to solving the dilemmas faced by modern firms toward the attainment of its IT-Business competitive advantage. This research addresses the following discussion topics.

1. Strategic Management: Foundation of the IT-Business Competitive Advantage
2. The Influence of Social Determinants in Corporate Alignment
3. Corporate Alignment Measuring Schemes
4. The IT-Business Competitive Advantage Conceptual Model

Understanding how to model the moderating effects of human factors - by the IT-Business management function - on the way to achieve corporate alignment, highlights a solution to the common struggle experienced by most modern firms, toward the achievement of its IT-Business competitive advantage.

Strategic Management: Foundation of the IT-Business Competitive Advantage

The efficiency of the IT-Business managerial role has its origins on the doctrines of strategic management. Strategic management is defined as the art and science of formulating, implementing, and evaluating cross-functional decisions that enable an organization to achieve its objectives.[8] A strategic management process is driven by the belief that organizations should continually monitor internal and external events and trends, so that timely changes can be made as needed. (For the purpose of this research, the monitoring activity is only referred to the internal events produced by the moderating effects of human factors.) A strategic management process calls for a timely and efficient intervention of the IT-Business management function, headed for the deployment of organizational strategies that take a modern firm to its IT-Business competitive advantage. The strategic management process
is represented as Level 1: **IT-Business Managerial Role Efficiency**, a business conceptual model denoted by Figure 1 - “The Five-Level Triad of IT-Business Competitive Advantage”. Level 1 pursuit the goal of an agile enterprise, one that is able to adapt rapidly, because of bad economic conditions and advances in mobile technology [9].

A strategic management process deals with the enforcement of policies and practices that enable the organization to astutely identify, and effectively adapt to change, in order to survive the competition. Three stages distinguish the strategic management process: *strategy formulation*, which includes developing a vision and mission and identifying an organization’s external opportunities and threat, while determining internal strengths and weaknesses; *strategy implementation*, which requires a firm to establish annual objectives, devise policies, motivate employees, and allocate resources so that formulated strategies can be executed; and finally, *strategy evaluation*, which is the primary means for obtaining information about why particular strategies are not working well. Three activities are included in *strategy evaluation*: reviewing external and internal factors that are the bases for current strategies, measuring performance, and taking corrective actions [8]. This research discusses further on the application of a measuring instrument that determines the alignment maturity level between IT and Business objectives, assisting in the improvement of the quality of managerial decisions.

The strategic management activity is not merely a formal system for control, but a system that facilitates learning processes; avoids bureaucratic mechanisms to successfully familiarize managers and employees with key strategic issues; use numbers to support words (instead of words to support numbers) when explaining strategic issues and organizational responses; and practices good business ethics that shall be applicable to society, the organization, and the natural environment. The involvement of IT-Business managers and employees, as active participants, in the strategic management processes, gives the opportunity to develop and grow the organizational culture based on open communication, trust, transparency, team work, collaboration, and encouragement for an easy flow of ideas and different points of view, resulting in a sense of loyalty to the firm.

The IT-Business management function – ultimate facilitator of the strategic management process - must exhibit the attributes (aptitudes and attitudes) necessary to perform the effective leadership role, on the way to the successful administration of the moderating effects of human factors. A fact is that the individuals, who perform IT-Business management functions, possess
her/his set of managerial tools, designed and applied, according to her/his attitudes and aptitudes. (For the purpose of this paper, the terms “attitude” and “aptitude” are applied on the merits of the following definitions.)

“Attitude is a predisposition or a tendency to respond positively or negatively towards a certain idea, object, person, or situation. Attitude influences an individual’s choice of action, and responses to challenges, incentives, and rewards (together called stimuli).”¹

“Aptitude is acquired or natural ability (usually measurable with aptitude tests), for learning and proficiency in a specific area or discipline. Aptitude is expressed in interest, and is reflected in current performance which is expected to improve over time with training.”²

Once the necessary social determinants (adequate attitudes and aptitudes) of the IT-Business management function are displayed at all hierarchy levels, of every business unit, within the organization, the Level 1 – IT-Business Managerial Role Efficiency – is achieved, the strategic management function is fulfilled, and the firm is ready to evolve from Level 1 to Level 2 – Employee Alignment, as is established by the business conceptual model, denoted by Figure 1 – “The Five-Level Triad of IT-Business Competitive Advantage”. This process acknowledges that strategic management is the foundation of the IT-Business Competitive Advantage.

The Influence of Social Determinants in Corporate Alignment

Since Information Technology (IT) is generally considered an enabler of a firm’s agility [3], the harmonization between IT capability and Business activities – IT-Business alignment - ensures speedy, effective, and efficient translation of innovative organizational responses. This harmony is dependent to a significant extent on moderating the effects of human factors, which influence on the alignment success, and consequently, on the IT effectiveness level.

According to empirical and theoretical literature few circumstances that influence corporate alignment are: IT characteristics, connections between IT and business planning systems, communication between IT and

¹ http://www.businessdictionary.com/definition/attitude.html
² http://www.businessdictionary.com/definition/aptitude.html
business executives, and implementation of previous IT plans. The literature defines “alignment” fundamentally affirming the same judgment:

- “The degree to which the information technology mission, objectives, and plans support and are supported by the business mission, objectives, and plans. The determinants of alignment are likely to be processes, for example, communication and planning.”[5]
- “The process and goal of achieving competitive advantage through developing and sustaining a symbiotic relationship between business and IT.”[1]
- “Alignment focuses on the activities that management performs to achieve cohesive goals across the organization.”[4]

The “alignment” definition involved the presence of social determinants as the common element of this organizational process. Human factors such as: communication, which deals with information exchange among the different actors (people) within the organization; planning, which relates to the strategy for the execution of the firm mission; symbiotic relation, which implies an agreement that benefits two or more parties (people, business units); and cohesion between IT and Business management functions, which implies a synergic collaboration on the way to attain a common goal, are few of the essential elements required to achieve the IT-Business competitive advantage.

The maturity of the IT-Business alignment produces a link that drives the organization to its firm’s agility – requirement for the IT-Business Competitive Advantage [2].

Since human activities have the potential to influence the harmonization between IT capability and Business activities, it is also envisioned the fact that IT implementers’ responses to IT user resistance certainly influence the IT-Business alignment too [6]. The literature firmly establishes there are two sides of the same coin - IT user resistance and IT implementer’s responses to user resistance – that potentiate or impede IT-Business alignment.

The “user resistance” factor is classified into five categories: manifestations of resistance, which is generally defined as a set of behaviors – such as apathy, sabotage, destructive behavior, denial, persistence of former behavior, and formation of coalitions - enacted by users to manifest some discontent with the implementation of a new IT; subject of resistance, which refers to the actor or actors – such as group or an organization - exhibiting resistance behavior; object of resistance, which is associated with the significance that the system has to the user, such as a loss of power or a loss of status; perceived threats, which corresponds to the negative assessment that
users make on the IT implementation, and initial conditions, which refers to the characteristics of the environment that interact with the object of resistance and influence the assessment that users make of the situation.

The “IT implementers’ responses” factor is mainly responsible for the attainment of the harmonization between IT and Businessobjectives - IT-Business alignment [6]. IT implementers - business managers, functional managers, IT professionals - can assume attitudes such as inaction, acknowledgment, rectification, dissuasion, to user resistance. IT implementers is defined as “those responsible for the introduction of the technology to prospective users” and “those responsible for the successful use of the system implemented”. The literature suggests that key interventions made by implementers may influence how resistance evolves and mentions that some actions taken to prevent resistance are: analyzing contextual factors, creating and communicating a vision, determining the optimal pace of change, and providing training and emotional support.

Identifying root causes and remediating/preventing the manifestation of new occurrences shall be an efficient strategy for the IT-Business managerial role to practice. Although the literature recognizes the importance of user resistance, it establishes that it has been paid little attention to IT implementers’ responses and their effect on the IT-Business alignment effort, when resistance occurs. The research literature implies the importance of a timely and efficient intervention of the IT-Business managerial role in moderating the effects of human factors, and the examination of positive human factors as determinants for the firm’s agility.

A main reason to focus the research objective on the employee perspective (user resistance) is because managers often know the IT-Business organizational strategies, but they flunk to effectively communicate (a social determinant) important information to other employees within the organization, resulting in the failure to achieve “IT-Business Managerial Role Efficiency”, Level 1 of the business conceptual model. Miscommunications between IT-Business managers and employees leaves room for perception (a social determinant) errors between both parties, reducing not just the chances of achieving Level 1, but also Level 2 – “Employee Alignment”, of the business conceptual model denoted by Figure 1 – “The Five-Level Triad of IT-Business Competitive Advantage”.

The literature states that Employee Alignment is particularly affected by the employees “perception” (a social determinant), which promotes positive reactions (like synergic ones) or negative reactions (like uncooperative
employees) that ultimately influence the attainment of IT-Business Competitive Advantage [1]. It also demonstrates that human factors associated to the employee, such as perceived organizational trust, perceived communications on IT-Business strategies to employees, and perceived knowledge on IT-Business strategies, have a positive and significant relationship on IT-Business Alignment [1].

Perceived organizational trust is a necessary human factor since it assists in the organization's success. Every organization requires the trust factor, including trust between managers and employees, as well as trust between employees and the organization. The trust factor occurs when an employee willingly becomes vulnerable to another, in exchange for a mutually beneficial outcome. Perceived communications on IT-Business strategies to employees refers to the benefits of a good communication, which is necessary for the successful implementation of a strategy. The communication factor is relevant for alignment and is considered successful if the transferred information from the sender to the receiver, its being fully understood by the receiver. Perceived knowledge on IT-Business strategies refers to the knowledge factor, which is a key foundation of the competitive advantage for an organization. The achievement of Employee Alignment can be affected by the moderating effects of the “perception” factor. The alignment of the employee is only achieved when the employee's behavior is compatible to the organization's strategy.

Since previous discussion dealt with employee-related human factors that influence the achievement of Employee Alignment, Level 2, however, further literature discussion evidences the occurrence of IT-Business management function-related human factors, which affect the achievement of IT-Business Alignment, Level 3 of the business conceptual model denoted by Figure 1 – “The Five-Level Triad of IT-Business Competitive Advantage”.

The literature establishes that IT-Business Alignment can be enabled or inhibited [4]. Achieving alignment between IT and Business objectives is an evolutionary and dynamic process that requires strong support from senior management, good working relationships, strong leadership, appropriate prioritization, trust, effective communication, as well as a thorough understanding of business environment. In general, the achievement of IT-Business Alignment demands focusing on maximizing the enablers and minimizing the inhibitors.

Some enablers of IT-Business Alignment, Level 3, are: senior executive support for IT; IT involvement in strategy development; IT understanding of business; IT and business close relationship as partners; IT strong leadership;
well prioritized IT projects; IT meeting commitments; IT achieving strategic goals; IT and business good communication. Inhibitors of the IT-Business alignment are social determinants that represent the opposite to all human factors previously stated. Also, factors related to “understanding” and “commitment” - such as shared knowledge, implementation success, communication, and convergence of planning objectives - influence the social dimension of alignment between IT and Business objectives [5].

In order for IT and Business objectives to harmonize and reach a common goal – IT Effectiveness, Level 4 of the business conceptual model denoted by Figure 1 – “The Five-Level Triad of IT-Business Competitive Advantage” - it is required the alignment of business units at both the planning (strategy) and execution (tactic) levels [7]. Alignment at the planning or strategic level ensures that IT plans and business plans are synchronized. Alignment at the execution level ensures that planned applications are successfully implemented, maintained and used, supporting the organization strategic goals. At both levels – planning and execution – social determinants emerge as a common element and require the modeling of a timely and efficient managing of the IT-Business managerial role.

Modern firms’ performance depends on its agility. The importance of Firms’ Agility is to be able to adapt rapidly to the competitive environment. It is essential for a modern firm to be an agile enterprise because of bad economic conditions and advances in mobile technology that may jeopardize its competitive edge [9]. Firm’s Agility is represented by the last progress level, Level 5, of the business conceptual model denoted by Figure 1 – “The Five-Level Triad of IT-Business Competitive Advantage”.

Once a modern firm achieves the corporate alignment – the fulfillment of the five progress levels (IT-Business Managerial Role Efficiency, Employee Alignment, IT-Business Alignment, IT Effectiveness, and Firm’s Agility) of the business conceptual model, denoted by Figure1 – “The Five-Level Triad of IT-Business Competitive Advantage”, signifies that the social determinants to all hierarchy levels, of every business unit, have been adequately addressed and modeled by the IT-Business management function. The IT-Business managerial role has been successful in its intent to modeling the moderating effects of human factors throughout the organization.

The achievement of the IT-Business Competitive Advantage is a dynamic process that requires continuous monitoring - of the alignment maturity levels – by the IT-Business management function, in order to get support for the managerial decision processes that lead to the corporate
continuous improvement and the development of innovative business strategies – vital elements for the attainment of the Firms’ Agility.

**Corporate Alignment Measuring Schemes**

As stated earlier in this research paper, the strategic management process is driven by the belief that organizations should continually monitor internal and external events and trends, so that timely changes can be made as needed [8]. In this intent, the discussion of a measuring scheme is available to the IT-Business management function.

The literature suggests a measuring instrument that assists the IT-Business management function in the determination of the IT-Business alignment maturity level, through the use of a survey instrument, that addresses the alignment gaps between IT and business. This specific instrument is based upon the Strategic Alignment Maturity Model (SAMM). SAMM proposes that IT-Business alignment can be captured according to six areas of maturity: communication maturity, which ensures ongoing knowledge sharing across the organization and the understanding of business by IT and vice versa; competency/value measurement maturity, which demonstrates the value IT is contributing to the business; governance maturity, which ensures that the appropriate participants of business and IT are reviewing the priorities and allocation of IT resources; partnership maturity, which reflects the level of trust developed among participants of IT and business in sharing risk and rewards; scope & architecture maturity, which signifies the level of flexibility and transparency the IT is providing to business; and skills maturity, which reflects the level of innovation, change readiness, hiring, and retaining, and how they are contributing to the overall organizations effectiveness.

SAMM describes the various attributes that contribute to each of the six areas. Collectively the six areas have thirty-eight attributes defined, and for each attribute, SAMM defines the characteristics at various levels of maturity. For each of these areas, this maturity model classifies the alignment between IT and Business into five levels: initial, committed, established/focused, improved/managed, and optimized. With the application of this measuring instrument the IT-Business management function may discover interesting findings which lead to alternative remedial strategies for better alignment, and for a sustainable IT-Business Competitive Advantage.
The IT-Business Competitive Advantage Conceptual Model

Figure 1 shows a business conceptual model built on the author's interpretation of the referenced literature. The conceptual model predicts the likeliness of a modern firm to attain its IT-Business Competitive Advantage, through the advancement of five progress levels, which are triggered by the timely and efficient intervention of the IT-Business managerial role, when the management function addresses and models the moderating effects of human factors at every hierarchy level, of every business unit, within the organization.

![Figure 1: The Five-Level Triad of IT-Business Competitive Advantage](image)

The model suggests the study of five variables that are positively correlated when analyzed in the forward direction (from Level 1 to Level 5): **IT-Business Managerial Role Efficiency (Level 1)** is considered the independent variable, while **Employee Alignment (Level 2), IT-Business Alignment (Level 3), IT Effectiveness (Level 4), and Firm’s Agility (Level 5)** are identified as dependent variables. The paper suggests that the attainment of each progress level is the result of timely and efficient administration of the variables, made by the IT-Business management function, resulting in a positive impact on the conquering of the organization’s IT-Business competitive advantage.

The accomplishment of **IT-Business Managerial Role Efficiency** is
founded on strategic management processes with the main objective of attaining the *Firm’s Agility*.

This research paper highlights the relevance of the IT-Business management function in addressing, on a timely and efficient fashion, the moderating effects of human factors, on the way to move from one progress level to the next, until finally attaining the IT-Business competitive advantage, and sustaining the accomplishments of all five progress levels.

According to the model, the IT-Business management function must have the attributes (i.e. aptitudes and attitudes) to execute a leadership role and administer each one of the objectives defined at the progress levels by moderating the effects of human factors all hierarchy levels, of every business unit, within any modern firm. The model suggests that there is an accumulative effort to go from one level to the next since the accomplishment of the levels must be sustained all the way through. In order to keep moving from one level to the next - increasing the organization’s likeliness to conquer the IT-Business competitive edge – it is required to sustain of objectives from previous levels. The accomplishment of Level 3 requires a sustainable accomplishment of Level 1 and Level 2. Once an objective is not accomplished on a sustainable fashion, IT-Business Competitive Advantage is at risk.

The proposed business conceptual model, “*The Five-Level Triad of IT-Business Competitive Advantage*”, predicts the organization’s likeliness to attain IT-Business competitiveness, and its concepts and rationale are applicable, not just to modern firms with Internet-based business models (e-commerce), but also to modern firms with traditional business models (not Internet-based).

The approach stated by the business conceptual model, highlights the fact of the moderating capacity of the independent variable (Level 1) over the dependent variables (Level 2 thru 5), but disregards the reality that the independent variable is also actively moderated, especially by social determinants that are inherent to it.

In general, the independent variable is strongly moderated by inherent social determinants, such as managerial attitudes and aptitudes. (This phenomenon is not object of study of this work and is being excluded from the scope of the paper.)

**Conclusions**

Human factors - social determinants that possess the potential to prevent and promote the achievement of the organization technological
objectives to attain the IT-Business Competitive Advantage - are frequently ignored, either deliberately or involuntarily, by the IT-Business management function, producing moderating effects that obstruct the IT-Business competitive edge.

The IT-Business managerial roles are the ultimate responsible for the accomplishment of these objectives, through the diligent address of the moderating effects of “human factors” – common element to all hierarchy level, of every business unit, within any modern firm.

The proposed business conceptual model, “The Five-Level Triad of IT-Business Competitive Advantage”, predicts the organization’s likeliness to attain IT-Business competitiveness, through the achievement of five progress level represented by one independent variable and four dependent variables, which are ultimately administered by the IT-Business management function.

The concepts and rationales proposed by the business conceptual model, are applicable, not just to modern firms with Internet-based business models (e-commerce), but also to modern firms with traditional business models (not Internet-based).

The IT-Business Managerial Role Efficiency (Level 1) is based on the doctrines of Strategic Management, which aim for the Firm’s Agility (Level 5) as the ultimate organizational objective.

The measuring instrument identifies alignment areas that relate to benchmarking, business metrics, strategic business planning, inter / intra organizational learning, architectural integration, and the impact of IT on business processes, evidencing that the alignment maturity level between IT and Business, is function of particular variables that closely relate to social determinants - human factors.

The independent variable - IT-Business Managerial Role Efficiency - is also affected by human factors, both external and internal, but mostly influenced by those inherent to it, resulting in a management performance driven as well by its own moderating effects.

References


The role of FDI inflows and outflows to host countries and from the source countries emerged in the 1980s as the major vehicle technology transfer that accelerated the globalization or international integration of 25 leading OECD economies over a period of 25 years (1983-2007). Although neoclassical and endogenous growth theories provide unequivocal support for FDI flows because they generate positive externalities or spillover effects through channels of GDP growth, capital formation and R&D, the empirical evidence in support of these claims are mixed. The panel data econometrics performed using a new multiplicatively complete index of total factor productivity provide fresh insights on the cross-border FDI generated through technology transfer and other channels. The empirical findings for the OECD countries are markedly different from the spillover effects on developing countries that are plagued by technology absorptive capacity effects due to the operation of threshold effects of underdeveloped human capital resources. The empirics on cross-border FDI flows and the spillover effects that they generate in OECD countries will provide much needed information to design and implement policies to harness the net benefits from cross-border FDI flows and shed light on the design of policies to reconcile the conflicting policies of austerity and growth that are required to prevent the sovereign debt racked euro-zone countries from imploding the single currency union based on the euro.

**Keywords:** FDI. Externalities. Panel Data Econometrics. OECD. Euro.

**JEL Classification:** O11, O40, F21, F23
Abbreviations

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<thead>
<tr>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>ABS</td>
<td>Australian Bureau of Statistics</td>
</tr>
<tr>
<td>ADF</td>
<td>Augmented Dickey Fuller</td>
</tr>
<tr>
<td>AIC</td>
<td>Akaike Information Criterion</td>
</tr>
<tr>
<td>CPI</td>
<td>Consumer Price Index</td>
</tr>
<tr>
<td>CRS</td>
<td>Constant Returns to Scale</td>
</tr>
<tr>
<td>DW</td>
<td>Durbin Watson</td>
</tr>
<tr>
<td>FDI</td>
<td>Foreign Direct Investment</td>
</tr>
<tr>
<td>FE</td>
<td>Fixed Effects</td>
</tr>
<tr>
<td>FGLS</td>
<td>Feasible Generalized Least Squares</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GERD</td>
<td>Gross Expenditure on R&amp;D</td>
</tr>
<tr>
<td>GLS</td>
<td>Generalized Least Squares</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
</tr>
<tr>
<td>IMF</td>
<td>International Monetary Fund</td>
</tr>
<tr>
<td>IPD</td>
<td>Implicit Price Deflator</td>
</tr>
<tr>
<td>ISIC</td>
<td>International Standard Industrial Classification</td>
</tr>
<tr>
<td>KPSS</td>
<td>Kwiatowski, Phillips, Schmidt and Shin</td>
</tr>
<tr>
<td>MFP</td>
<td>Multifactor productivity</td>
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<tr>
<td>MNCs</td>
<td>Multinational Corporations</td>
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<tr>
<td>OECD</td>
<td>Organization for Economic Co-operation &amp; Development</td>
</tr>
<tr>
<td>OLS</td>
<td>Ordinary Least Squares</td>
</tr>
<tr>
<td>PC</td>
<td>Productivity Commission</td>
</tr>
<tr>
<td>PPP</td>
<td>Purchasing Power Parity</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>RE</td>
<td>Random Effects</td>
</tr>
<tr>
<td>TFP</td>
<td>Total Factor Productivity</td>
</tr>
<tr>
<td>TNC</td>
<td>Transnational corporation</td>
</tr>
<tr>
<td>UNCTAD</td>
<td>United Nations Conference on Trade and Development</td>
</tr>
<tr>
<td>VA</td>
<td>Value Added</td>
</tr>
<tr>
<td>WTO</td>
<td>World Trade Organization</td>
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</table>
Introduction

The OECD economies are currently in the throes of a sovereign debt crisis that threatens to wreck the euro zone or the common currency union that was established after the Maastricht treaty (1991). The euro zone economies, the PIGS (Portugal, Italy, Greece and Spain) are hovering on the brink of insolvency due to their inability to service their sovereign debt and contain their deficits without a massive bail out from the European Central Bank and the IMF. The strategies to avert the break-up the euro zones advocate the implementation of polices of austerity (spending cuts) on the one hand and growth on the other, in the debt ravaged OECD countries.

This paper presents empirics on how to reconcile policies of austerity, which is code for increase in Total Factor Productivity (TFP) with growth, which is the code for increasing cross-border FDI flows. The impending implosion of the euro zone requires the implementation of massive structural adjustment in the shape of tax-payer funded bailouts to recapitalize banks in the PIGS. The failure to do so would lead to the break-up of the single currency union or the euro zone with the resulting crisis contagion not only adversely affecting the economies of the OECD but also the global economy.

The cross-border transfer and diffusion of technology through Foreign Direct Investment (FDI) under the aegis of Multinational Corporations (MNCs) has been a major force in the globalization or linking of the OECD counties more rapidly with the international economy during the study period 1983-2007. The nexus between cross-border FDI flows and the acceleration of GDP growth has been the subject of intensive research and heated debate over in recent decades. Both neoclassical economic theory and endogenous or new growth theory lend unequivocal support to the proposition that FDI flows are vehicles of cross-border transfer of technology that accelerates productivity and potential growth in both the host and source countries. However, empirical studies fail to match the hype of economic theory and an acrimonious debate has raged between supporters of increased FDI flows and those opposed to such increases on diverse grounds that range from environmental pollution to the undermining of national interest and economic independence.

The literature survey undertaken for this study clearly reveal that despite the overwhelming theoretical support for cross-border FDI flows on the grounds that they are vehicle for transfer of technology and act as the motor of productivity and GDP growth by generating benign technological externalities or spillover effects the empirical evidence in support of these
claims are at best mixed. In this paper, we identify some of the grounds for this skepticism and provide statistical evidence based on panel data econometrics shedding light on the nexus between FDI and TFP on several issues: First, the failure of the FDI flows, GDP and TFP growth to live up to the theoretical hype is examined, and its genesis due to the methodological flaws that mired past studies is addressed. In this regard a major flaw lies in the use of OLS estimates based on pooled cross-section time series approach that fails to take remedial measures to overcome the problems associated with parameter heterogeneity, outliers, omitted variables, model uncertainty, measurement error and endogeneity, low power of statistical tests that sap the reliability out of the empirics churned out by these methods. In this paper, we attempt to overcome these deficiencies by applying panel data econometric techniques.

Second, much of the theoretical and empirical analysis relating to the FDI flows has focused on the externalities or spillover effects associated with the promotion of GDP growth. However, in this paper argue that the focus should be directly on the nexus between TFP growth and FDI flows rather than on the misplaced focus on the more amorphous measure, GDP growth. Second, in order to analyze more incisively the technological spillovers generated by TFP growth due to FDI flows the paper covers new ground by analyzing the empirical results related to the computation of multiplicatively complete TFP indexes that links FDI to TFP and technological spillovers effects that can be measured in the shape of scale economies, technical efficiency and technological change. Third, the paper also advances the knowledge frontier on the TFP-FDI empirics by considering both the crowding-out and crowding-in effects of cross-border, FDI flows on both the host country and the source country domestic investments and industries. These positive or negative spillover effects from the cross-border MNC-FDI flows that may be driven by the pecuniary motives of lowering production costs by vertical integration or by the motive to access to new markets through horizontal integration are reviewed. Fourth the empirical analysis undertaken in this paper recognizes that the level of human capital and institutional fabric may impose constraints on the absorptive capacity of technology transferred by FDI to generate positive technological spillover effects on the host or source country. In particular we recognize that absorptive capacity for technology transferred by FDI is vastly different from that prevailing in developing countries hamstrung by poor infrastructure, lack of sound banking and financial institutions, law and order and a business friendly environment. The empirical analysis undertaken in this study has used the most up-to-date panel dataset for 25 OECD countries
over the span of 25 years (1983-2007). The panel data set has been sourced from the most authoritative databases available from international organizations like the OECD, UNCTAD, World Bank and independent sources such as the Penn World Tables.

It is worthwhile recapitulating and elaborating on the contributions of the paper’s claims to make in advancing the knowledge frontier on the FDI-TFP empirics and on at least five fronts: i. The paper has refocused attention on the TFP linked spillover effects in this study rather than on the more indirect GDP related spillover effects that has been the focus of most empirical studies on FDI flows undertaken hitherto. ii. The paper contributes to the advancement on the knowledge frontier on cross-border MNC-FDI flows by analyzing spillover using for the first time a multiplicatively complete index, which enables the decomposition of technological change due to FDI flows into measurable spillover effects in the form of scale economies and technical efficiency. iv. The empirical results reported in this paper are fully cognizant of the consequences of the divergence in the absorptive capacity in host and source countries for metabolizing and generating spillover effects. In particular developing countries lack the human capital, infrastructure, banking and financial institutions and business ethos that gives OECD countries a head start over developing countries in attracting MNC-FDI flows. iv. The empirical results of the study have taken account of both the crowding-in and crowding-effects on domestic firms of both FDI inflows and outflows in a symmetric manner unlike many other studies that have focused only on one side of the coin. v. Finally the empirics in the paper are based on the compilation of an up-to-date and comprehensive panel database from the most authoritative international and national databases that have been published recently.

The stylized facts reported in Table 1 indicate that over the past three decades since the 1980s world FDI outward stocks and inward stocks have increased more than 25-fold and 30-fold, respectively. The growth of both inward and outward FDI stocks for the world has outstripped the growth rates of GDP and exports after registering temporary drops during the Asian Financial Crisis (1997) and the Global Financial Crisis (2007). It is noteworthy that for advanced countries, FDI flows exceeded the growth rates of GDP and exports and these strong growth trends are likely to continue into the foreseeable future. Although the Asian Financial Crisis (1997) and the Global Financial Crisis (2007) caused a dent in the inward and outward stocks of FDI, the stylized facts reported in Table 1 show that bi-directional flows have grown at phenomenal rate over the two decades since 1980. The growth of FDI
inward and outward flows have exceeded the world growth rates of exports and GDP. These stylized facts indicate that FDI will continue to power the growth of productivity and growth in the world economy. Policymakers in both developed and developing countries have re-designed policies to attract FDI flows. An index of national regulatory changes compiled from survey data from the World Investment Report (UNCTAD) shows that over the 15 years (1992-2006) 80 percent of regulatory changes undertaken by policymakers in the global economy has been aimed at encouraging FDI flows to the host countries (Contessi and Weinberger 2009).

Table 1: Stylised facts on inward & outward FDI stocks (1980-2000) US$ billion.

<table>
<thead>
<tr>
<th>ECONOMY</th>
<th>FDI Stock</th>
<th>FDI Stock</th>
<th>Annual Growth Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing economies</td>
<td>299</td>
<td>524</td>
<td>4893</td>
</tr>
<tr>
<td>Outward</td>
<td>401</td>
<td>1555</td>
<td>12325</td>
</tr>
<tr>
<td>World</td>
<td>700</td>
<td>2082</td>
<td>17743</td>
</tr>
<tr>
<td>Developed economies</td>
<td>72</td>
<td>145</td>
<td>863</td>
</tr>
<tr>
<td>Inward</td>
<td>477</td>
<td>1941</td>
<td>16011</td>
</tr>
<tr>
<td>World</td>
<td>549</td>
<td>2086</td>
<td>18982</td>
</tr>
<tr>
<td>Developed economies</td>
<td>2594</td>
<td>3956</td>
<td>16606</td>
</tr>
<tr>
<td>GDP</td>
<td>8297</td>
<td>11427</td>
<td>38817</td>
</tr>
<tr>
<td>World</td>
<td>11897</td>
<td>22262</td>
<td>57193</td>
</tr>
<tr>
<td>Nominal</td>
<td>670</td>
<td>996</td>
<td>5811</td>
</tr>
<tr>
<td>World</td>
<td>1663</td>
<td>3189</td>
<td>9452</td>
</tr>
<tr>
<td>Exports</td>
<td>2424</td>
<td>4311</td>
<td>15834</td>
</tr>
</tbody>
</table>

Source: UNCTADSTAT (2010) UNCTAD

Attracting FDI has been a major plank of national development strategies in both developed and developing economies. At national level there are strategies to reduce entry barriers (protection) and offer incentives to FDI (tax-holidays). Table 2 below reports the strong trends in the increase in OECD inflows and outflows during the 14 year period (1995-2008) in most
OECD countries is shown below. USA recorded an inflow of more than 5 fold, nearly 5-fold Australia nearly 4 fold. The outflow of FDI during the 14 year period was more than 3-fold for USA and more than a 10-fold for Australia. The FDI flows, are likely continue to increase the stock of domestic capital in most FDI during the next decade and is likely to play a pivotal role in increasing productivity and growth in OECD economies.

Table 2: Trends in FDI Inflows & Outflows - OECD (1995-2008) $US bn

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>12.0</td>
<td>46.6</td>
<td>389.2</td>
<td>3.3</td>
<td>35.8</td>
<td>1090.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Austria</td>
<td>1.9</td>
<td>13.5</td>
<td>710.3</td>
<td>1.1</td>
<td>28.2</td>
<td>2489.7</td>
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<tr>
<td>Belgium</td>
<td>59.6</td>
<td></td>
<td>68.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>9.3</td>
<td>44.7</td>
<td>482.9</td>
<td>11.5</td>
<td>77.6</td>
<td>677.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denmark</td>
<td>4.2</td>
<td>10.7</td>
<td>256.2</td>
<td>3.1</td>
<td>27.3</td>
<td>891.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>1.1</td>
<td>-4.2</td>
<td>-394.4</td>
<td>1.5</td>
<td>1.6</td>
<td>108.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>23.7</td>
<td>97.0</td>
<td>409.6</td>
<td>15.8</td>
<td>200.0</td>
<td>1269.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>12.0</td>
<td>24.9</td>
<td>207.0</td>
<td>39.1</td>
<td>156.2</td>
<td>399.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greece</td>
<td>1.2</td>
<td>5.1</td>
<td>424.3</td>
<td>2.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iceland</td>
<td>0.0</td>
<td>-0.4</td>
<td>-4211.1</td>
<td>0.0</td>
<td>-8.1</td>
<td>-32400.0</td>
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<td></td>
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<tr>
<td>Ireland</td>
<td>1.4</td>
<td>-12.3</td>
<td>-851.5</td>
<td>0.8</td>
<td>13.2</td>
<td>1610.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Italy</td>
<td>4.8</td>
<td>17.0</td>
<td>353.0</td>
<td>5.7</td>
<td>43.8</td>
<td>763.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>0.0</td>
<td>24.4</td>
<td>22.6</td>
<td>128.0</td>
<td>565.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Korea</td>
<td>1.8</td>
<td>2.2</td>
<td>123.9</td>
<td>3.6</td>
<td>12.8</td>
<td>360.2</td>
<td></td>
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</tr>
<tr>
<td>Mexico</td>
<td>9.7</td>
<td>22.0</td>
<td>226.8</td>
<td>0.7</td>
<td></td>
<td></td>
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<tr>
<td>Netherlands</td>
<td>12.3</td>
<td>-9.1</td>
<td>-73.6</td>
<td>20.2</td>
<td>53.1</td>
<td>263.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td>2.9</td>
<td>2.0</td>
<td>69.3</td>
<td>1.8</td>
<td>0.1</td>
<td>5.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td>2.4</td>
<td>-0.1</td>
<td>-3.9</td>
<td>2.9</td>
<td>28.1</td>
<td>983.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portugal</td>
<td>0.7</td>
<td>3.5</td>
<td>534.1</td>
<td>0.7</td>
<td>2.1</td>
<td>306.9</td>
<td></td>
<td></td>
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<tr>
<td>Spain</td>
<td>6.3</td>
<td>65.4</td>
<td>1040.8</td>
<td>4.2</td>
<td>77.2</td>
<td>1855.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>14.4</td>
<td>40.4</td>
<td>279.6</td>
<td>11.2</td>
<td>40.2</td>
<td>358.4</td>
<td></td>
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</tr>
<tr>
<td>Switzerland</td>
<td>2.2</td>
<td>17.4</td>
<td>782.7</td>
<td>12.2</td>
<td>86.3</td>
<td>706.2</td>
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</tr>
<tr>
<td>Turkey</td>
<td>0.9</td>
<td>18.2</td>
<td>2053.2</td>
<td>0.1</td>
<td>2.6</td>
<td>2287.6</td>
<td></td>
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<tr>
<td>United Kingdom</td>
<td>20.0</td>
<td>96.0</td>
<td>480.6</td>
<td>43.6</td>
<td>110.4</td>
<td>253.5</td>
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</tbody>
</table>
The rest of the paper is organized as follows: Section 2 presents an annotated literature review on the role played by FDI in generating TFP and growth through net positive spillover effects or positive externalities. Section 3 outlines the methodology used in this paper to measure a multiplicatively complete index of TFP that is decomposable into components of technical change and various measures of technical efficiency that can act proxy measures of technological spillover effects due to FDI. Section 4 outlines the methodology of panel data econometrics that has been deployed in this study to measure the link between changes in TFP and FDI in the context of other major explanatory and controlling variables governing the economies of the panel of OECD countries studied in this paper. Section 5 presents the key empirical findings that link TFP changes to cross-border FDI flows subject to openness, R&D, capital formation and control variables due to policy effects of inflation and government spending and business cycle effects. Section 6 concludes the paper offering some policy perspectives.

**Literature Review**

The importance of increasing total factor productivity or output as ratio of the various factor input is widely recognized to be a key determinant of a nation's growth and enhancement of the living standards of its populace as underscored in the quotes of several eminent economists:

“Productivity...in the long run it is almost everything.” (Krugman,1994).

“Nothing contributes more to reduction of poverty..”, than productivity (Blinder, 1993) “Productivity is the prime determinant in the long run of a nation's standard of living.“ (Porter,1991).

The empirical literature on the measurement of productivity identifies as a core indicator increase in *per capita* GDP as a measure of improvement a country's living standards due to technical progress. The literature identifies technological change as an important determinant of growth and productive
externalities. Neoclassical growth theory identified exogenous technical progress as an important driver of growth (Solow, 1956). Endogenous growth models ascribe an important role to technological change for achieving perpetual or sustainable economic growth (Romer, 1990). These growth theories have identified two important channels through which FDI transfers technological change across borders. The first channel, known as the diffusion channel, plays a catalytic role in advanced countries by generating productivity externalities through the transfer x-efficiency (i.e. managerial, marketing, product and process innovation, and access to markets and adaptation of advanced country technologies) according to (Coe, 1995, Grossman, 1991, De Mello, 1997). The second channel through which FDI transfers technology is known as the absorption channel and plays a significant role in increasing productivity and growth in the host country by facilitating the absorption, adaptation, imitation, ‘learning- by- doing’ and reverse engineering of new technology innovated in advanced countries (Coe, 1995, Savvides, 2005).

In this paper, we regard the increase in nation’s TFP as the major fulcrum that generates positive externalities or spill over effects due to the cross-border transfer of technology via FDI.

The major bone of contention is whether inward FDI stocks complements (crowds-in) or substitutes (crowds-out) domestic investment. The crowding-in hypothesis contends that FDI inward stocks alters the ownership structure of domestic investment and provides additional capital, technological know-how, R&D that stimulates product and process innovation, provides access to overseas marketing networks – and thus increases the profitability of domestic investors. On the contrary, the crowding-out hypothesis contends that FDI inward stocks reduces the market share of domestic firms, decreases profitability and drives domestic firms to the wall. Below, we list the arguments that have been advanced by the proponents of the crowding-in and crowding-out hypothesis based on a selective survey of the literature.

The proponents of the crowding-in hypothesis assert that FDI inflows cause’s domestic firms in the host country to: i. Increase their investment in the domestic firms in order to meet the competitive challenges posed by FDI (De Mello, 1999). ii. FDI inflows could increase investment in infrastructure (transport and telecommunication) (Cardoso and Dornbusch, 1989). iii. FDI brings in its train the firm specific assets that promote innovation of new products and processes (Herzer, 2008) (Blomström M., 1998). iv. FDI will increase demands for host country factor inputs (capital and labour). v. FDI

The proponents of the crowding-out hypothesis associate a number of adverse effects with FDI inward stocks. i. The technological superiority of FDI gives them an advantage over domestic firms to exploit profitable investment opportunities that arise (Fry M.J., 1992, Agosin M. R. and Mayer R., 2000). (Kokko A., 1994). ii. Under conditions of imperfect competition the advent of FDI in the host country could reduce the market share of domestic firms and drive them to the wall due to reduce profitability (Kokko A., 1994). iii. Domestic investment has no crowding out effects on domestic investments by increasing imports and causing a worsening of the terms of trade increases in the current account and balance of payments deficits (Stevens, 1992).iv. FDI can also crowd-out domestic firms because of the inability of domestic firms to compete successfully with MNCs and their affiliates and subsidiaries for the limited credit and financial resources that are available to a host nation (Apergis N. Katrakilidis C. and Tabakis M., 2006). The openness to trade and investment through trade liberalisation does not appear to have crowding out effects on domestic investment according to studies by (Harrison and Revenga A., 1995).

The crowding-in and crowding-out effects of FDI operate through a complex matrix of channels giving results that diverge from theoretical predictions and intuition of the policymakers. Therefore, whether FDI inflows can through net crowding-in effects can generate positive externalities in the host or source country has to be resolved by empirical analysis (Desai and 2005). A task which will be addressed in the next section.

FDI by MNCs are motivated by the objective of lowering production costs either by vertical integration abroad or through access to new markets through horizontal integration. The positive negative spillover effects from these different types of integration vary according to the degree of FDI competition with domestic firms and market share in the host economy (Arndt, 2010). Cross-country regressions empirics performed at the macro-level indicate that technology transfer by FDI flows have different types of growth and productivity externalities in advanced and developing countries. In developing countries...
for technology transfer through FDI to ignite positive growth and productivity externalities it is imperative that the developing country should have attained a critical threshold level of human capital development, well functioning capital markets and open or liberal trading regimes to have the absorptive capacity to benefit from the technology transferred by FDI (Carkovic, 2009, Borensztein, 1998, Xu, 2000a, Carkovic. M. and Levine. R., 2009). Some cross-country regression studies demonstrate that technology transfer through FDI flows generate positive externalities in host countries even if there is no strong absorptive capacity due to the absence of a developed human capital threshold (Khawar, 2005). Some cross-country regression studies based on developing countries demonstrate that openness to trade through the implementation of export oriented industrialization strategies rather than inward looking import substituting industrialization strategies are crucial for the positive growth and productivity externalities for technology transfer through FDI flows to occur (Balasubramanyam, 1996, Xu, 2000b). However, allowing unfettered technology transfer through FDI by removing capital controls before the establishment of a sound financial and banking system could lead to moral hazard outcomes due to the absence of prudential supervision of FDI flows rendering the host country vulnerable to financial crises due to ‘sudden stops’ of capital flows due to panic behavior by foreign investors (Bhagwati, 1978, Stiglitz, 2009).

The above literature review clearly establishes the case to analyze the effects of FDI flows on advanced countries separately from those of developing countries as they are subject to different human capital and financial structure threshold effects. Furthermore, the importance of analyzing the effects of spillover effects of FDI flows by focusing on components of total factor productivity rather than GDP growth is more insightful and provides useful guidelines for policymakers confronted with the task of designing policies for regulating the inflow and outflow of FDI flows in a manner consistent with national interest.

The literature of the empirical effects of cross-border net FDI inflows are shrouded in ambiguity and therefore rigorous empirical analysis is required to shed light on the complex dynamics linking cross-border FDI flows and the TFP related spill over effects they generate.
The Measurement of Total Factor Productivity (TFP)

It is our contention that the direct measurement of TFP and externalities or spill over effects due FDI inward or outward stocks provide a more incisive measure of externalities than that provided by the use of GDP growth as in most empirical studies undertaken on the subject to date. The measurement of TFP poses formidable challenges and much of the neoclassical growth literature use growth accounting to obtain TFP as a residual from by rearranging components of a Cobb-Douglas, Translog of CES production function. The ‘Solow residual’ obtain from the Cobb-Douglas production function (Solow, 1956) is used to measure TFP and some critics regard it as an “an index of ignorance” although Solow popularised this as a measure of the unobserved component as a measure of TFP or exogenous technological progress. In this study, we break new ground by measuring TFP using a multiplicatively complete index number to measure TFP. A multiplicatively complete index number enables the decomposition of measures of TFP into components of technical change and several measures of technical efficiency as hypothesised by (O’Donell CJ., 2009, O’Donell, 2008). In this study, we argue that these components provide proxy measures of technological spill over associated with FDI cross-border flows.

The methodology used in this study to measure TFP assumes that TFP resulting FDI flows into a country in period t is a ratio of aggregate output \( Q_t \) to aggregate input \( X_t \) defined by:

\[
TFP_t = \frac{Q_t}{X_t}
\]

(1)

The by computing the ratio defined below TFP growth from period 0 to period t for a given country in terms of an index number:

\[
TFP_{0t} = \frac{Q_{0t}}{X_{0t}}
\]

(2)

The TFP index number defined above satisfies the properties of multiplicative completeness and therefore lends itself to decomposition to components of technical change (O’Donell CJ., 2009). The components can be used to measure important technological spill over effects generated by FDI flows that have eluded rigorous quantification so far. The decomposition of the TFP index into input-oriented components of technical change can be explained following O’Donnell, in Figure 1 in the input-output or X-Q space.
In the Figure the change in TFP from period 0 and period t is depicted by a change in the slopes of the rays that pass through the origin at point A and Z, shown by the angles and marked by the lower case letters a and z. The index that measures the change in TFP between period 0 and 1 for a given country can be defined by the ratio of the angles or the tangents as shown below, where tane represents TFP at some non-negative point E on the X-Q space:

$$TFP_{ot} = \frac{\text{tanz/tane}}{\text{tane/tana}}$$  \hspace{1cm} (3)

The equation (3) demonstrates that an index of TFP that can be expressed in terms of ratios of output and input changes can be decomposed into several input-oriented decompositions that also double up measures of spill over effects. The input-oriented decomposition measures have also output oriented counterparts, which have similar interpretation and meaning.

**Figure 1. Measuring and Decomposing TFP change**

Movements from point A to a point E in Figure 1 measures TFP efficiency (TEFP) or the gap between technology used by a country and the best practice technology frontier or maximum potential TFP that that is available in period 0 and defined by $TFP_{0^*}$. The measure of TFP efficiency, which can be factorized into different input-oriented components as shown below:

$$TFPE_{0} = \frac{TFP_{0}}{TFP_{0^*}} = ITE_{0} \times ISE_{0} \times RME_{0}$$  \hspace{1cm} (4)

where,

ITE: Input-oriented technical efficiency = the difference between observed TFP and the maximum possible TFP given fixed input-mix, output-
mix and output levels.

**ISE:** Input-oriented scale efficiency = difference between TFP at a technically efficient point and the maximum possible TFP while letting output vary given fixed input and output mixes.

**Residual Mix Efficiency (RME)** = difference between TFP at a point on a mix restricted frontier and the maximum TFP possible when input and output mixes and levels) are variable.

A measure of TFP efficiency for period 1 or TFPE₁ can be decomposed in a manner analogous to that given in equation (4) and the ratio of the two decompositions enables the specification of a multiplicatively complete index of TFP change between period 0 and 1 as shown below:

\[
TFP_{0t} = \frac{TFP_t}{TFP_0} = \left[ \frac{TFP_t}{TFP_0} \right] \times \left[ \frac{ITE_t}{ITE_0} \times \frac{ISE_t}{ISE_0} \times \frac{RME_t}{RME_0} \right]
\]

(5)

In equation (5) the first term within parenthesis on the right hand side measures technical change and is given by the ratio of the difference between the maximum potential TFP that can be generated using technology available in period t and the period 0, respectively. The other ratios measure technical efficiency change, scale efficiency change and residual mix that occur between period 0 and t. The input oriented measures of technical change have output-oriented counterparts that have similar interpretations. The DPIN Software based on non-parametric data envelope analysis (DEA) written by (O’Donell CJ., 2009) has been used in this study to decompose the multiplicatively complete using the Moorsteen-Bjurek TFP index and the results are reported in Table 3. Several other index numbers satisfy the properties of multiplicative completeness that facilitates the decomposition of TFP changes based in meaningful components of technical change and technical efficiency that also can be interpreted as spillover effect measures. The other index numbers that satisfy the properties of multiplicative completeness include, Laspeyres, Paasche, Fisher Ideal, Tornquist, Hicks-Moorsteen indexes. However, it is noteworthy that widely used Malmquist index popularized by(Caves, 1982) fails to satisfy the properties of multiplicative completeness and therefore cannot be used in the analysis of spillover effects due to technological change caused by FDI flows. The DPIN software also provides estimate of the decomposition of both input and output oriented technical, scale and mix-efficiency and also measures of components of TFP change are reported in Table 3 and Table 4.
respectively and are given below:

**Table 3**: Measures of technical, scale & mix efficiency

<table>
<thead>
<tr>
<th>Year</th>
<th>Obs</th>
<th>Country</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
<tr>
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<td>26</td>
<td>Australia</td>
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</tr>
<tr>
<td>1982</td>
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<td>Canada</td>
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</tr>
<tr>
<td>1982</td>
<td>42</td>
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</tr>
<tr>
<td>1982</td>
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<td>UK</td>
<td>0.53</td>
</tr>
<tr>
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</tr>
<tr>
<td>1992</td>
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<td>Canada</td>
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</tr>
<tr>
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<tr>
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<td>667</td>
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<tr>
<td>2007</td>
<td>674</td>
<td>UK</td>
<td>0.02</td>
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**Table 4**: Decomposition of changes in tfp spillover effects

<table>
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<tr>
<th>Year</th>
<th>Obs</th>
<th>N</th>
<th>Country</th>
<th>TFP score</th>
<th>dTech</th>
<th>dEff</th>
<th>dOTE</th>
<th>dOSE</th>
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<td>0.84</td>
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<td>1</td>
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<td>0.64</td>
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<td>1</td>
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<tr>
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<td>1</td>
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<td>USA</td>
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<td>1</td>
<td>0.74</td>
<td>0.73</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1992</td>
<td>276</td>
<td>1</td>
<td>Australia</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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</table>
Panel data econometrics

Panel data econometrics used in this paper incorporate unit root and co-integration tests that overcomes the bias and inconsistency problems vitiating OLS estimators computed from pooled cross-section time-series data by addressing a number of limitations by: i. The identification of parameters of crucial FDI-TFP relationships without imposing too many restrictive assumptions. ii The computation of more efficient estimators than those provided by pure time-series or cross-section datasets or any combination of them using the same sample size (Nijman and Verbeek 1990).iii. Providing insights on the ‘true state dependence’ and ‘spurious state dependence’ based on history of individual observations(Heckman, 1978). iv. Reducing the bias due to omitted variables that arises due to the undermining of the assumption that explanatory variables are uncorrelated with the error term (Mundlak, 1961) v. Identifying valid internal instruments for regression that are affected by measurement error, where the transformed original variable transformed into a variable that is correlated with explanatory variables in the model but uncorrelated with the error term. The advantages of panel data econometrics are also critically surveyed by (Hsiao, 2003) and (Baltagi, 2005) and others.
Panel unit root tests

Panel unit root tests are the multiple series analogue of unit root tests of a Univariate series. Panel unit root tests than their Univariate counterparts. The panel unit root tests can be classified based on restrictions on the autoregressive process across cross-sections or series. If the AR(1) process for panel data is given by:

\[ y_{it} = \rho_i y_{it-1} + X_{it} \delta_i + \epsilon_{it} \]

We report in this paper the unit root tests due to (Levin, 2002) or LLC, (Im, 2003) or IPS which are panel unit root analogues of the Phillips-Perron (PP) and Augmented Dickey Fuller (ADF) tests. We also report the results for the Hadri test (Hadri, 2000) which tests the null of stationary against the alternative in a panel setting in a manner analogous to the KPSS test in the univariate case. Furthermore, the Maddala and Wu (1999) MWa panel unit root test is based on the combination of the p-values of i cross-section unit root tests using a Fisher (1932) index. Here i= 1,...N, cross-sections and pi are the p-value of the i-th cross-section. The resulting non-parametric MW tests could be computed using the Augmented Dickey Fuller (ADF) or Phillips-Perron (PP) statistic which defined by \( P(y) = -2 \sum_{i=1}^{N} \log (pi) \sim x^2 (N_d.f). \) A detailed description of these statistics is given in the EVIEWS 7.1 Manual.

Panel co-integration tests

Panel co-integration tests estimate the long-run equilibrium relationship between the TFP and FDI variables of interest. The Engle-Granger Representation theorem (Engle and Granger 1987) postulates if the variables of interest are integrated order one I(1) and if the residuals of the regression which specifies a linear combination of the variables of interest are stationary or I(0), then the variables of interest are co-integrated.

The methodology enunciated by (Pedroni, 1999) is invoked to implement co-integration tests or tests for long-run equilibrium relationships among the major variables linking total factor productivity and FDI and other major economic variables. The Pedroni methodology which is analogous to follows the Engle-Granger two-step procedure in the univariate case, allows for the testing for the presence of heterogeneous slope coefficients, fixed effects.
and individual specific deterministic trends in the co-integration equation (1) as exemplified below:

$$y_{it} = \alpha_i + \sum_{j=1}^{m} \beta_{ij} x_{jt} + \varepsilon_{it}$$  \hspace{1cm} (1)

Where the residuals estimated from the panel regression equation (1) follows the AR-process given in equation (2), where testing for co-integration is a test of whether the null-hypothesis $H_0: \beta_i = 1$ for all $i$ in the equation (2) below:

$$\varepsilon_{it} = \rho_i \varepsilon_{i,t-1} + \zeta_{it}$$  \hspace{1cm} (2)

Pedroni formulates seven statistics based on the residuals of the co-integration regression above.. The asymptotic distributions derived from these panel co-integration are used to derive critical values for the co-integration test statistics under standardizations, based on the moments of Brownian motion functions, which are distributed standard normal (Pedroni 1999: 660-661). The seven statistics formulated by Pedroni to test the null of no co-integration in heterogeneous panels are classified into four “within-dimension” panel tests and three “between-dimension” group tests. The within-dimension tests take into account common time factors and allow for heterogeneity across countries. The between-dimension tests are group mean tests that take into account of heterogeneity of parameters across countries.

**Granger causality tests**

In order to test for the direction of causality between TFP and FDI variables we first estimate the variants of the panel co-integration equation (1) by applying the methodology of based on the Engle-Granger residual method as to panel data by Pedroni (2001). The estimated equations only reveal the existence or not of co-integrating relationships among the variables of interest. In order to determine the direction of causality between TFP and FDI we estimate bivariate Granger causality tests by imposing restrictions on
coefficients defined in the set of equations (3) below:

\[
\Delta(TFP_{it}) = \alpha_i + \sum_{k=1}^{p} \beta_{11} \Delta \log(\text{FDII}_{it-k}) + \sum_{k=1}^{p} \beta_{12} \Delta \log(\text{FDO}_{it-k}) + \varepsilon_{1it} \\
\Delta \log(\text{FDII}_{it}) = \alpha_i + \sum_{k=1}^{p} \beta_{11} \Delta(TFP_{it-k}) + \sum_{k=1}^{p} \beta_{12} \Delta \log(\text{FDO}_{it-k}) + \varepsilon_{2it} \\
\Delta \log(\text{FDO}_{it}) = \alpha_i + \sum_{k=1}^{p} \beta_{11} \Delta \log(\text{FDII}_{it-k}) + \sum_{k=1}^{p} \beta_{12} \Delta(TFP_{it-k}) + \varepsilon_{3it}
\]

(3)

The symbol $\Delta$ refers to the difference operator and $k=1,..p$ refers to lag length based on Schwartz Information Criterion (SIC). The null-hypothesis of FDII not Granger causing TFP and the reverse causality null are tested by imposing restrictions and testing for the joint null-hypothesis $H_0$:

$\sum_{k=1}^{p} \beta_{11} = 0$ for $\forall i$ and $k, \beta_{16} = 0$ using an F-test with the appropriate d.f.

Next, we describe the theory underpinning the empirical validation of a model describing the nexus between TFP and FDI and other macro-economic explanatory variables and control variables identified in the literature review as important influences that impinge on the TFP-FDI dynamics of the panel dataset under study in this paper.

Before, empirically validating the fully-fledged model we carry out the Hausman (1978) test to determine whether the model is best described by a Fixed Effect (FE) or Random Effect (RE) model. We can specify the static linear Fixed Effects model that explains the TFP of country $i$ in year $t$ given by $y_{it}$ as a linear regression framework. Where the intercept term $\alpha_i$ proxies the country specific or idiosyncratic fixed effects and the $k$ explanatory variables and control variables (as detailed in Table 5 below) are defined by $x_{it}$ and $u_{it}$ the independently, identically distributed stochastic disturbance term with zero mean and constant variance as specified in (1) below:

\[
y_{it} = \alpha_i + x_{it} \beta + \mu_{it}, \quad \mu_{it} \sim \text{IID}(0, \sigma^2) \quad (4)
\]

The above equation could be re-written as OLS regression with dummy variables $d_{ij}=1$ if $i=j$ or 0 otherwise, representing the idiosyncratic fixed effects ith- country described by the intercept term in (1), giving:
\[ y_{it} = \sum_{j=1}^{N} a_j d_{ij} + x_{it}' \beta + \mu_{it}, \] (6)

The estimates of the coefficients of the dummy variables \( d \) and the explanatory variables \( \beta \) can be obtained as the Least Squares Dummy Variable (LSDV) estimator by applying OLS method to equation (2). However, a less complicated method of obtaining the same estimates is through the application of OLS to after transforming equation (1) into the demeaned or mean, deviation. This transformation produces observations that deviations from individual means and eliminates the fixed effects or the intercept term \( \alpha_i \). This transformation based on observations that deviate from the means is also referred to as the within transformation and the OLS estimator of \( \beta \) obtained from is defined as the within estimator or fixed effects estimator is \( \tilde{\beta}_{FE} \). It is an unbiased and consistent estimator of \( \beta \) when the requirements for the FE model are satisfied. That is i. First, the explanatory variables \( x_{it} \) should be uncorrelated with the idiosyncratic disturbance term \( x_{it} \). ii. Second, the explanatory variables, if strictly exogenous, should be independent of the past, current and future values of the idiosyncratic disturbance term. iii. Third, the error term should be homoscedastic.

The degrees of freedom (df) correction for obtaining the fixed effects estimator by applying pooled OLS to the time demeaned version of equation (1) we are dealing with a total of NT observations and k independent variables. For each cross-section or country i, we lose 1 df because of time-demeaning. Therefore, the appropriate df that should be used in tests of significance is \( NT - N - k = N(T-1)-k \).

The focus in the FE model is on the differences ‘within’ individual countries, i.e. it explains to what extent \( y_{it} \) differs from the mean of each country, but it does not explain why the mean of \( y \) differs across countries. The FE regression parameters explain effects that are identified only through the within dimension of the data.

**The Random Effects (RE) Model**

In regression analysis it is assumed that all the factors that affect the dependent variable that have been exclude are incorporated in the error term. This leads to the assumption that \( \alpha_i \) are random factors that are i.i.d. over individual countries and enables the specification of the RE model as follows:
Perspectives on Total Factor Productivity and Foreign Direct Investment in OECD Countries
based on Panel Data Econometrics

\[ y_{it} = x'_{it}\beta + \alpha_i + \mu_{it}, \quad \alpha_i \sim \text{IID}(0, \sigma^2_{\alpha}), \mu_{it} \sim \text{IID}(0, \sigma^2_{\mu}) \]  

(7)

Where \( \alpha_i + \mu_{it} \) is a composite error term comprising of an individual country specific component that a time-invariant component that is uncorrelated over time. Therefore, all the correlation over time is associated with the country specific effect \( \alpha_i \). Furthermore, since \( \alpha_i \) and \( u_{it} \) are mutually independent of \( x_{it} \), the OLS estimates of the \( \beta \) parameters in (8) are unbiased and consistent. The composite error exhibits is subject to a particular form of autocorrelation and therefore estimators that are more efficient can be obtained by exploiting the structure of the error covariance matrix to obtain more GLS estimators of the regression parameters. The GLS transformation is captured in a parameter \( \lambda \) that eliminates the serial correlation as described by complex matrix algebra (Wooldridge 1999, Chapter 10). The OLS pooled estimator is obtained when \( \lambda = 0 \) and the fixed effects (FE) estimator is obtained when \( \lambda = 1 \). When the estimated \( \lambda \) is closer to unity he random effects (RE) model provides a more appropriate estimator than the FE model set out in the equations below:

\[
\Delta (\text{TFP}_{it}) = \alpha_i + \sum_{k=1}^{p} \beta_{11} \Delta \log (\text{FDII}_{it-k}) + \sum_{k=1}^{p} \beta_{12} \Delta \log (\text{FDIO}_{it-k}) + \varepsilon_{1_{it}} \\
\Delta \log (\text{FDII}_{it}) = \alpha_i + \sum_{k=1}^{p} \beta_{11} \Delta (\text{TFP}_{it-k}) + \sum_{k=1}^{p} \beta_{12} \Delta \log (\text{FDIO}_{it-k}) + \varepsilon_{2_{it}} \\
\Delta \log (\text{FDIO}_{it}) = \alpha_i + \sum_{k=1}^{p} \beta_{11} \Delta \log (\text{FDII}_{it-k}) + \sum_{k=1}^{p} \beta_{12} \Delta (\text{TFP}_{it-k}) + \varepsilon_{3_{it}} 
\]  

(8)

The symbol \( \Delta \) refers to the difference operator and \( k = 1, \ldots, p \) refers to lag length based on Schwartz Information Criterion (SIC). The null-hypothesis of FDII not Granger causing TFP and the reverse causality null are tested by imposing restrictions and testing for the joint null-hypothesis Ho: \( \sum_{k=1}^{p} \beta_{11} = 0 \) for \( \forall i \) and \( \beta_{16} = 0 \) using an F-test with the appropriate degree freedom.

**Empirical results**

The empirical results reported in this study are based on annual data from a sample of 25 OECD countries and aims to explain the total factor productivity (TFP) growth effect due to FDI inflows, FDI outflows estimated using the panel data econometrics as outlined in Section 3. We use FDI stocks
rather than FDI flows, because stocks, due to accumulation of flows, capture the long run effects better than flows (Bitzer J and Gorg H., 2009).

**Table 5:** Panel data modelling variables & data sources

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Source</th>
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<tr>
<td>∆LOG(TFP&lt;sub&gt;i,t&lt;/sub&gt;)</td>
<td>Growth of TFP index</td>
<td>Database</td>
</tr>
<tr>
<td>LOG(GDP&lt;sub&gt;i,t&lt;/sub&gt;)</td>
<td>GDP at constant 1990 prices &amp; exchange rates</td>
<td>WDI</td>
</tr>
<tr>
<td>LOG(GDPPC&lt;sub&gt;i,t&lt;/sub&gt;)</td>
<td>GDP per capita at constant 1990 prices &amp; exchange rates</td>
<td>Database</td>
</tr>
<tr>
<td>∆LOG(FDII&lt;sub&gt;i,t&lt;/sub&gt;)</td>
<td>Stock of Inward FDI</td>
<td>WDI</td>
</tr>
<tr>
<td>∆LOG(FDIO&lt;sub&gt;i,t&lt;/sub&gt;)</td>
<td>Stock of outward FDI</td>
<td>WDI</td>
</tr>
<tr>
<td>∆LOG(OPEN&lt;sub&gt;i,t&lt;/sub&gt;)</td>
<td>Trade in goods &amp; non-factor services as a percent of GDP</td>
<td>WDI</td>
</tr>
<tr>
<td>∆LOG(GERD&lt;sub&gt;i,t&lt;/sub&gt;)</td>
<td>Government expenditure on R&amp;D</td>
<td>OECD Statistics</td>
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<tr>
<td>INFL&lt;sub&gt;i,t&lt;/sub&gt;</td>
<td>Inflation measured by the change in the implicit price deflator</td>
<td>WDI</td>
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<td>Government expenditure</td>
<td>WDI</td>
</tr>
<tr>
<td>∆LOG(CAPF&lt;sub&gt;i,t&lt;/sub&gt;)</td>
<td>Stock measure of capital formation</td>
<td>WDI</td>
</tr>
<tr>
<td>∆LOG(DEFL&lt;sub&gt;i,t&lt;/sub&gt;)</td>
<td>GDP or the Implicit Price Deflator</td>
<td>WDI</td>
</tr>
<tr>
<td>∆(1-1/LOG(EMP&lt;sub&gt;i,t&lt;/sub&gt;))</td>
<td>Business Cycle Effect, EMP&lt;sub&gt;i,t&lt;/sub&gt;: Total Annual Hours Worked</td>
<td>PWT 6.2</td>
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<tr>
<td>YEAR</td>
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<td>Database</td>
</tr>
</tbody>
</table>

Notes: ∆: first difference operator. i = 1,...,N (Countries), t =1,...,T (Years).
∆LOG (Variable) = Growth rate of the variable.
Sources: WDI – World Development Indicators, UNCTAD Handbook of Statistics 2009
PWT – Penn World, Table 6.2: The Conference Board Total Economy Database.
Relates to the Database: See Appendix

In the empirical investigation, we test whether the major variables of interest relating to FDI inflows and outflows exhibit a long-run equilibrium or are co-integrated. Descriptive statistics on these variables or interest are reported in Table 6 below. Second, the results of the panel unit root tests on the major variables that govern the TFP-FDI nexus are reported in Table 7. Third, the results of Pedroni’s heterogeneous panel co-integration tests
to determine whether co-integration or a long-run equilibrium relationship between TFP and FDI inflow and outflow variables, are reported in Table 8. Fourth, in order to determine the direction of causality from TFP to FDI flows, thereby shedding light on whether the crowding-out or crowding in hypothesis is supported or not is reported in Table 9. Fifth, the tests on whether the fixed versus random effects models are presented in Table 10. Thereafter, the results of the empirical validation of a fully-fledged model with several explanatory and control variables that govern the nexus between TFP and FDI for the panel of OECD countries is presented in Table 11.

**Table 6: Descriptive statistics on tfp-fdi variables of interest**

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<th>ΔLOG (FDII)</th>
<th>ΔLOG (FDIO)</th>
<th>ΔLOG (OPEN)</th>
<th>ΔLOG (GERD)</th>
<th>ΔLOG (CAPF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>0.008191</td>
<td>0.006988</td>
<td>0.006118</td>
<td>5.88E-05</td>
<td>0.002199</td>
<td>0.003221</td>
</tr>
<tr>
<td>Median</td>
<td>-0.001960</td>
<td>-0.158858</td>
<td>0.275549</td>
<td>0.000000</td>
<td>0.470267</td>
<td>0.064484</td>
</tr>
<tr>
<td>Maximum</td>
<td>4.860258</td>
<td>6.965840</td>
<td>5.502585</td>
<td>1.917710</td>
<td>8.088514</td>
<td>4.491951</td>
</tr>
<tr>
<td>Minimum</td>
<td>-4.908558</td>
<td>-5.307135</td>
<td>-6.569557</td>
<td>-1.402750</td>
<td>-8.786252</td>
<td>-5.722499</td>
</tr>
<tr>
<td>Std. Dev.</td>
<td>0.621428</td>
<td>1.992358</td>
<td>2.543926</td>
<td>0.667126</td>
<td>2.392626</td>
<td>2.088444</td>
</tr>
<tr>
<td>Skewness</td>
<td>0.096557</td>
<td>0.582428</td>
<td>0.001057</td>
<td>0.292247</td>
<td>-0.503612</td>
<td>-0.487793</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>29.12507</td>
<td>4.029327</td>
<td>2.437156</td>
<td>2.648096</td>
<td>2.942057</td>
<td>2.975804</td>
</tr>
<tr>
<td>Probability</td>
<td>0.000000</td>
<td>0.000000</td>
<td>0.016164</td>
<td>0.002333</td>
<td>0.000002</td>
<td>0.000004</td>
</tr>
<tr>
<td>Sum</td>
<td>5.119607</td>
<td>4.367785</td>
<td>3.824007</td>
<td>0.036725</td>
<td>1.374181</td>
<td>2.013237</td>
</tr>
<tr>
<td>Sum Sq. Dev.</td>
<td>240.9717</td>
<td>2476.962</td>
<td>4038.254</td>
<td>277.7157</td>
<td>3572.186</td>
<td>2721.637</td>
</tr>
<tr>
<td>Observations</td>
<td>625</td>
<td>625</td>
<td>625</td>
<td>625</td>
<td>625</td>
<td>625</td>
</tr>
</tbody>
</table>

The panel unit root tests were performed on the main variables of interest that link FDI inwards (FDII) and outward (FDIO) stocks and total factor productivity (TFP). The panel unit root tests on the levels of the variables reported in Table 6 indicate that the p-values of the variables exceed 0.05 and therefore the null hypothesis of a unit root is not rejected and all the variables integrated order one or I(1). On the basis of the Levin et al. t-test ((Levin, 2002), the panel Fisher ADF and the Panel Fisher PP tests due to (Maddala, 1999).. While for the panel tests (Hadri, 2000) which reverses the null and alternative
hypothesis like the KPSS test in the univariate the results reported in Table 7 reject the null of I(0) or stationarity in favor of the unit root alternative while the tests of the first difference form of the variable support the null of I(0) and reject the alternative of I(1) or non-stationarity. Therefore, the tests all reveal that all the variables or interest are integrated order 1 or I(1) and their linear combinations could be co-integrated as hypothesized by the Engle-Granger representation theorem (Engle, 1987).

**Table 7: Panel unit root tests**

<table>
<thead>
<tr>
<th>Variable</th>
<th>LOG(FDII)</th>
<th>LOG(FDIO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>Statistic</td>
<td>p-value</td>
</tr>
<tr>
<td>Levin, Lin &amp; Chu t*</td>
<td>-0.28</td>
<td>0.39</td>
</tr>
<tr>
<td>ADF - Fisher Chi-sq.</td>
<td>22.19</td>
<td>1.00</td>
</tr>
<tr>
<td>PP - Fisher Chi-sq.</td>
<td>24.78</td>
<td>1.00</td>
</tr>
<tr>
<td>Hadri Z-stat</td>
<td>2.02</td>
<td>0.02</td>
</tr>
<tr>
<td>Het consistent Z</td>
<td>1.77</td>
<td>0.04</td>
</tr>
<tr>
<td>First difference</td>
<td>∆LOGDII</td>
<td>p-value</td>
</tr>
<tr>
<td>Levin, Lin &amp; Chu t*</td>
<td>-33.18</td>
<td>0.00</td>
</tr>
<tr>
<td>ADF - Fisher Chi-sq.</td>
<td>678.59</td>
<td>0.00</td>
</tr>
<tr>
<td>PP - Fisher Chi-sq.</td>
<td>832.29</td>
<td>0.00</td>
</tr>
<tr>
<td>Hadri Z-stat</td>
<td>6.64</td>
<td>0.00</td>
</tr>
<tr>
<td>Het Con Z</td>
<td>5.82</td>
<td>0.00</td>
</tr>
</tbody>
</table>

**Explanatory Notes:**
Null: Unit root (assumes common unit root process) for the Levin, Lin & Chu t-test
Null: Unit root (assumes individual unit root process for the ADF-Fisher & PP-Fisher tests
Automatic lag length selection based on SIC: 0 to 4 on SIC
Newey-West automatic bandwidth selection and Bartlett kernel
Fisher Tests: Probabilities computed assuming asymptotic Chi-square distribution and all other
Hadri Tests: High autocorrelation leads to severe size distortions and over-region of the null.

Next, the Pedroni methodology to test the null of no co-integration in dynamic heterogeneous panels with multiple regressors is implemented for FDI-TFP series of interest ((Pedroni, 1999, Pedroni, 2001, Pedroni, 2004). The test results provide insights on the heterogeneity among individual countries on the relationships based on the panel data both in the long run and in the short-run as shown by co-integrating vectors with significant error correction mechanism.

In conventional time-series analysis co-integration occurs when a linear combination of variables that are individually integrated or order one i.e. I (1) are stationary or I(0). The vector of slope coefficients in the linear combinations defines the co-integrating vector. Panel of co-integration tests overcomes the problem of low power when applied to series of moderate length. Pooling the panel data across individual countries is designed to overcome the lower power of tests when sample size is small by making available more information available through the panel approach. Recall that this issue was discussed in Section 4.

The Pedroni methodology offers seven different statistics, four of which are known as the panel tests are based on the pooling the residuals in estimating the regression along the within-dimension. The other three tests are known as group panel tests based on the pooling the residuals of the regression along the between-dimension. The within-dimension or panel tests, takes into account common time factors and allows for heterogeneity across countries. While the between-dimension or group means co-integration tests, allow for heterogeneity of parameters across countries. These seven panel co-integration and the critical values based on Monte Carlo simulations discussed in (Pedroni, 1999).

The results of the Panel unit root tests based on the Pedroni methodology are reported in Table 8 below:
Table 8: Pedroni residual cointegration tests

<table>
<thead>
<tr>
<th>Major Series of interest: ΔΔTFP, ΔLOG(FDII), ΔLOG(FDIO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Null Hypothesis: No co-integration</td>
</tr>
<tr>
<td>Trend assumption: Deterministic intercept and trend</td>
</tr>
<tr>
<td>Automatic lag length selection based on SIC with a max lag of 4</td>
</tr>
<tr>
<td>Newey-West automatic bandwidth selection and Bartlett kernel</td>
</tr>
<tr>
<td>Alternative hypothesis: common AR coef. (within-dimension)</td>
</tr>
<tr>
<td>Panel tests</td>
</tr>
<tr>
<td>Panel v-Statistic</td>
</tr>
<tr>
<td>Panel rho-Statistic</td>
</tr>
<tr>
<td>Panel PP-Statistic</td>
</tr>
<tr>
<td>Panel ADF-Statistic</td>
</tr>
<tr>
<td>Alternative hypothesis: individual AR coef. (between-dimension)</td>
</tr>
<tr>
<td>Group tests</td>
</tr>
<tr>
<td>Group rho-Statistic</td>
</tr>
<tr>
<td>Group PP-Statistic</td>
</tr>
<tr>
<td>Group ADF-Statistic</td>
</tr>
</tbody>
</table>

Pedroni co-integration tests support the rejection of the null of no co-integration for 9 out of the 11 estimated panel co-integration tests that tests the growth rate of productivity (DTFP), foreign direct investment in flow (FDII) and outflows (FDIO). The within-dimension individual panel unit root tests reported in the Panel v-Statistic rejects the null of no co-integration. While all the between-dimension group statistic tests rejects the null hypothesis of no co-integration. Therefore, the Pedroni heterogeneous panel co-integration tests provide support for the hypothesis that the growth of total factor productivity and foreign direct investment inflows and outflows are co-integrated or exhibit a long-run equilibrium relationship.

However, the above tests fail to provide information on the direction of causation. This issue is tackled by the bivariate Granger causality tests the results of which are reported in Table 9 and the results indicate that the growth of foreign direct investment inflows cause increase total factor productivity and growth in total factor productivity in turn increases foreign direct investment inflows, thereby indicating the existence of bi-directional causality between foreign direct investment inflow (FDII) and growth of total factor productivity (TFP) causality. The bi-directional causality test results lend support to the
crowding-in hypothesis that FDI inflows and outflows by increasing TFP that has the potential to generate positive externalities. However, FDI - inflows do not appear to Granger cause FDI-outflows and there was no evidence here to support bi-directional causality. These results, nevertheless provide support for the crowding-output hypothesis and imply that FDI outflows support the crowding out hypothesis which has the potential to generate negative externalities through its adverse effects on domestic firms. The bivariate Granger causality tests are reported in Table 9.

Table 9: Pairwise granger causality tests

<table>
<thead>
<tr>
<th>Null Hypothesis:</th>
<th>Obs</th>
<th>F-Stat</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DLOG(FDII) does not Granger Cause DTFP</td>
<td>575</td>
<td>0.0945</td>
<td>0.9098</td>
</tr>
<tr>
<td>DTFP does not Granger Cause DLOG(FDII)</td>
<td></td>
<td>0.0597</td>
<td>0.942</td>
</tr>
<tr>
<td>DLOG(FDIO) does not Granger Cause DTFP</td>
<td>575</td>
<td>0.5104</td>
<td>0.6006</td>
</tr>
<tr>
<td>DTFP does not Granger Cause DLOG(FDIO)</td>
<td></td>
<td>0.3856</td>
<td>0.6802</td>
</tr>
<tr>
<td>DLOG(FDIO) does not Granger Cause DLOG(FDII)</td>
<td>575</td>
<td>7.9405</td>
<td>0.0004</td>
</tr>
<tr>
<td>DLOG(FDII) does not Granger Cause DLOG(FDIO)</td>
<td></td>
<td>18.806</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Further empirical results based on FGLS estimate of equation

The empirical results reported in this study are based on annual data from a sample of 25 OECD countries and aims to explain the total factor productivity (TFP) growth effect due to FDI inflows, FDI outflows, openness of the economy to international trade, government expenditure on R&D, capital formation after controlling for the effects of government expenditure, inflation and business cycle effects that reverberate through unemployment.

The empirical analysis has been performed by validating a cross-country panel time-series regression model specified in equation (1) has been empirically validated for a sample of 25 OECD countries to explain the spillover effects due TFP resulting from the effects of FDI inward stocks and outward stocks, technology transfer effects after controlling for key policy and structural effects as explained below:
\[
\Delta \text{TFP}_i = \alpha_i + \beta_1 \Delta \text{FDII}_i + \beta_2 \Delta \text{FDIO}_i + \beta_3 \Delta \text{OPEN}_i + \beta_4 \Delta \text{GERD}_i + \beta_5 \Delta \text{CAPF}_i + \beta_6 \Delta \text{GOVX}_i + \beta_7 \Delta \text{NFL}_i + \beta_8 (1-1/\Delta \text{EMP}_i) + \epsilon_i \tag{3}
\]

Where,

- \( y_{it} = \Delta \text{TFP}_i \), \( x_{it} = (\Delta \text{FDII}_i, \Delta \text{FDIO}_i, \Delta \text{OPEN}_i, \Delta \text{GERD}_i, \Delta \text{CAPF}_i, \Delta \text{GOVX}_i, \Delta \text{INFL}_i, (1-1/\Delta \text{EMP}_i) \).
- \( i = 1, \ldots, N \), \( t = 1, \ldots, T \).

All the variables noted with \( \Delta \) estimate growth rates using the log difference of the variable for the country \( i \) in year \( t \). The explanatory variables are: TFP: Total Factor Productivity, FDII: FDI inward stocks, FDIO: FDI outward stocks, OPEN: Openness to trade, GERD: R&D expenditure, CAPF: Capital Formation and the control variables are: GOVX: Government Expenditure, INFL: Inflation, UNEMP: Unemployment, the intercept term \( \alpha_i \): country-specific fixed effect, \( \epsilon_{it} \): idiosyncratic error. Since the sample of OECD countries is assumed to have attained the same threshold level of development no proxies have been included to capture any institutional variations among the countries. In the empirical validation we have assumed that country-specific fixed effects are a more crucial determinant in account for variation of TFP spillover effects and GDP growth effects due FDI flows as hypothesized by Nath (2009) rather than the time invariant initial conditions as are proxies by GDP per capita (GDPPC) or the Barro-effec in the convergence theory postulated by Barro and Xala-i-Martin (1995).

Table 5 summarizes the definitions of the variables and data-sources used in the empirical validation of the panel data TFP and FDI spillover effects model for the OECD countries investigated in this study.

The regression results from the 9 sets of regressions using feasible GLS estimation with cross-country weights are reported in Table 6. Regression models referred in column (i) to (6) uses time-invariant GDP per capita (GDPPC) or the Barro effect, the results reported for regression models in columns ((7) to (9)) are based on cross-country specific fixed effects model. The standard errors have been estimated using White's hetero-scedasticity consistent-variance covariance estimates that are robust to general hetero-scedasticity. The regression models estimated with the time-invariant initial conditions (or Barro-effect) do not provide efficient estimators. But the regression models for cross-country specific effect models provide efficient estimators and therefore we focus mainly on these results for analyzing the TFP spillover effects due to FDI inward and outward stocks. Regression equation (7) includes inward FDI (FDII) but excludes the outward FDI (FDIO), while equation (8) includes FDIO but excludes FDII. Equation (9) includes both inward and outward FDI stocks. The regression coefficients for FDII and FDIO have positive and significant impacts on the TFP growth variable. The results
from equation (9) are undermined by the multi-collinearity between growth rates of FDII and FDIO. The value for the growth of FDII is 0.01 implying that 1% increase in growth of FDI inward stock results in growth of TFP by 0.01 percent. The coefficient of FDIO or growth of outward stock of FDI is also around 0.01 and is significant. Besides, R&D (GERD), capital formation (CAPF) also have, positive effects on growth TFP as expected.

The control variables relating to policy proxies by government expenditure (GOVX), inflation (INFL) and business cycle effects due to unemployment (1-1/EMP) all have negative effects on TFP growth as expected. The interaction term is not statistically significant and the regression results fail the residual test. Given that the sample of countries have attained the same threshold level of absorptive capacity.

It is noteworthy that empirical results for the TFP spillover effects and FDI inward and outward stocks and other explanatory and control variables are consistent with results reported for cross-section time-series studies for other countries (Borensztein, 1998) (Ghosh, 2009, van Pottelsberghe, 2001).

Table 10: Tests for pool, redundanttnt fixed effects, and hausaman random effects.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.0040</td>
<td>0.0239</td>
<td>0.1656</td>
<td>0.8685</td>
</tr>
<tr>
<td>DLOG(FDII)</td>
<td>0.0129</td>
<td>0.0270</td>
<td>0.4799</td>
<td>0.6315</td>
</tr>
<tr>
<td>DLOG(FDIO)</td>
<td>-0.0057</td>
<td>0.0173</td>
<td>-0.3275</td>
<td>0.7434</td>
</tr>
<tr>
<td>DLOG(OPEN)</td>
<td>0.0174</td>
<td>0.0551</td>
<td>0.3149</td>
<td>0.7529</td>
</tr>
<tr>
<td>DLOG(GERD)</td>
<td>0.0020</td>
<td>0.0117</td>
<td>0.1701</td>
<td>0.8650</td>
</tr>
<tr>
<td>DLOG(CAPF)</td>
<td>0.0250</td>
<td>0.0568</td>
<td>0.4408</td>
<td>0.6595</td>
</tr>
<tr>
<td>DLOG(GOVX)</td>
<td>-0.0272</td>
<td>0.0550</td>
<td>-0.4955</td>
<td>0.6204</td>
</tr>
<tr>
<td>INFL</td>
<td>0.0002</td>
<td>0.0007</td>
<td>0.3724</td>
<td>0.7097</td>
</tr>
<tr>
<td>DLOG(1-1/EMP)</td>
<td>-1.5840</td>
<td>18.2916</td>
<td>-0.0866</td>
<td>0.9310</td>
</tr>
<tr>
<td>DLOG(FDII)*DLOG(GERD)</td>
<td>-0.0064</td>
<td>0.0062</td>
<td>-1.0300</td>
<td>0.3034</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.0026</td>
<td></td>
<td>Mean dependent var</td>
<td>0.0107</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>-0.0122</td>
<td>S.D. dependent var</td>
<td>0.5584</td>
<td></td>
</tr>
<tr>
<td>F-statistic</td>
<td>0.1780</td>
<td>Durbin-Watson stat</td>
<td>1.2319</td>
<td></td>
</tr>
<tr>
<td>Prob(F-statistic)</td>
<td>0.9963</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The LS estimates of the pooled cross-section time-series effects reported in Table 8 above indicate that neither the intercept term (C) nor the explanatory variables are statistically significant as the p values exceed 0.30. The result that the intercept term or country specific fixed effects are the same for all countries is both intuitively and statistically inappropriate. Therefore, the Likelihood Ratio test for redundant fixed effects is performed and the results indicate that the Chi-squared and F-test version for restricting i. The cross-section fixed effects to zero. ii. The period fixed effects to zero. iii. Both cross-section and period effects to zero are not rejected as the associated p-values exceed 0.29. Therefore, the pooled sample is not rejected. Nevertheless, additional insights on the DGP are provided by testing for the significance of random effects of countries (cross-sections) but not periods (time). Furthermore, the results of the Hausman test for testing the null-hypothesis that the random effects are uncorrelated with the explanatory variables indicate that Chi-squared test statistic for 9 d.f. has a p-value <0.10 rejecting the validity of the random effects model in favor of the fixed effects model at the 10% level of significance. Therefore, the empirical tests reported above lend support to premise that the equations based on panel data fixed estimates econometric models reported in Table 7 below would provide plausible estimates on the TFP FDI dynamics for the OECD countries during the study period.
### Table 11: Panel regression equations – barro & country - specific effects

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Per periods included: 24</td>
<td>Cross-sections included: 25</td>
</tr>
<tr>
<td>Sample (unbalanced) observations: 586</td>
<td></td>
</tr>
<tr>
<td>White diagonal standard errors &amp; covariance (d.f. corrected)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DEPVAR</th>
<th>Equation 1</th>
<th>Coeff.</th>
<th>P-value</th>
<th>Equation 2</th>
<th>Coeff.</th>
<th>P-value</th>
<th>Equation 3</th>
<th>Coeff.</th>
<th>P-value</th>
<th>Equation 4</th>
<th>Coeff.</th>
<th>P-value</th>
<th>Equation 5</th>
<th>Coeff.</th>
<th>P-value</th>
<th>Equation 6</th>
<th>Coeff.</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOG(GDPPC) or CONST.</td>
<td>0.0016</td>
<td>0.0521</td>
<td>0.0014</td>
<td>0.0742</td>
<td>0.0014</td>
<td>0.0794</td>
<td>0.0133</td>
<td>0.0111</td>
<td>0.0132</td>
<td>0.0117</td>
<td>0.0132</td>
<td>0.0119</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DLOG(FDII)</td>
<td>0.0056</td>
<td>0.2028</td>
<td>0.0021</td>
<td>0.3896</td>
<td>0.068</td>
<td>0.1241</td>
<td>0.0030</td>
<td>0.2337</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DLOG(FDIO)</td>
<td>-0.0026</td>
<td>0.3746</td>
<td>0.0001</td>
<td>0.9573</td>
<td>-0.0029</td>
<td>0.3359</td>
<td>0.0004</td>
<td>0.8234</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DLOG(GDP)</td>
<td>0.0039</td>
<td>0.6116</td>
<td>0.0032</td>
<td>0.6822</td>
<td>0.0031</td>
<td>0.6957</td>
<td>0.0050</td>
<td>0.4997</td>
<td>0.0047</td>
<td>0.5283</td>
<td>0.0049</td>
<td>0.5215</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DLOG(GERD)</td>
<td>-0.0014</td>
<td>0.5602</td>
<td>-0.0010</td>
<td>0.6531</td>
<td>-0.0013</td>
<td>0.5875</td>
<td>-0.0007</td>
<td>0.7461</td>
<td>-0.0003</td>
<td>0.9083</td>
<td>-0.0005</td>
<td>0.8362</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DLOG(CAPF/GDP)</td>
<td>-0.0016</td>
<td>0.8494</td>
<td>-0.0013</td>
<td>0.8710</td>
<td>-0.0015</td>
<td>0.8612</td>
<td>-0.0048</td>
<td>0.5227</td>
<td>-0.0039</td>
<td>0.6035</td>
<td>-0.0041</td>
<td>0.5841</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DLOG(GOVX/GDP)</td>
<td>-0.0001</td>
<td>0.9921</td>
<td>-0.0001</td>
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Explanatory notes.

Equation (1) to (3)  
Barro-effect proxied by DLOG(GDPPC) & INTERACTION EFFECT is PROXIED BY DLOG(FDII)/DLOG(GERD)

Equation (4) to (6)  
IDYISYCRATIC COUNTRY (CROSS-SECTION) FIXED EFFECTS ARE PROXIED BY THE CONSTANT TERM.

The adjusted R-sq shows that fixed effects models have a better 'Goodness of fit' than the Barro initial effect models.

The p-value fails to reject the no Barro-effect null hypothesis at 5% level.

The p-value rejects the null hypothesis of no cross-section fixed effects at 5% level.

The tests favour the fixed cross-section effects model rather than the Barro effect model.

HAUSAMAN-TEST- Correlated Random Effects

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P-VALUE <12% IMPLIES THAT RANDOM-EFFECTS MODEL IS NOT VALID AT < 12% LEVEL OF SIGNIFICANCE.
The interpretation of the empirical results reported in Table 9, are presented in the sequel.

The Hausman test results favor the cross-section or country fixed effects models rather than the random effects model at a p-value =0.12. The panel regression models (equations (1) to (3) in Table 9) indicate that the Barro-initial effect (coefficient of DLOG (GDPPC) have p-values >0.05 implying that the null-hypothesis that the Barro-effect is not significant at the 5% level of significance. The panel regression model (equations (4) to (6) in Table 7), indicate that p-value =0.01 implies the null that cross-sectional fixed effects are not-significant is not rejected at the 1% level of significance. Furthermore, the goodness of fit given by adjusted-R-squared is much higher for the country-specific fixed effects than the adjusted R-squared from the panel regressions (equations (4) to (6) Table 9) are much higher than the adjusted R-squared values for the Barro-effects panel regression equations (1) to (3) implying support for country-specific effects that Barro initial effects for the OECD countries during the study period.

The above finding that the country-specific’ fixed effects’ play a crucial role in explaining growth of TFP spillover effects than Barro ‘initial effects’ in the advanced (OECD) countries is consistent with similar findings in the GDP growth-FDI cross country empirics. These studies underscore that in developing countries that have not attained a threshold level of institutional development due to underdeveloped human capital, financial sector, the Barro initial conditions play a pivotal role in determining the absorptive capacity of FDI related growth spillover effects. While, in advanced countries TFP or growth spillover effects are not subject to institutional threshold constraints and the countries country-specific fixed effects play a key role in governing the technology transfer through FDI flows (Ghosh M and Wang W., 2009, Carkovic. M. and Levine. R., 2009). Equation (1) to (3) Table 7 report the results for the’ Barro effect’ which are proxies by time-invariant initial conditions as captured by the log of per capita GDP (log GDPPC) as the crucial determinant of FDI flows and related TFP spillover effects for OECD countries as hypothesized by the convergence theories (Barro, 1995). The empirical findings for OECD countries differ from those reported for developing countries where the country-specific effects rather than the “Barro initial effect’ plays the significant role in determining whether FDI flows play the role of TFP increase and associated positive spillover effect” (Ghosh M and Wang W., 2009).

The panel data empirics reported in Table 9 therefore clearly support the hypothesis that time-invariant initial conditions play a significant role
in developed OECD countries in the transmission of technological spillover effects mainly through the conduits of FDI flows and of R&D (GERD). All the panel data regression empirics reported in Table 7, have been estimated using feasible GLS with cross-country weights. The standard errors have been estimated using White’s hetero-scedasticity consistent co-variances corrected for degrees of freedom yielding estimates that are robust to general heteroscedasticity using EVIEWS 7 computer software.

The Barro time-invariant initial conditions are significant for equation (1) and (3) with FDI inward stocks but not significant in FDI outward stocks. Therefore, initial conditions appear to play a significant role in inward stocks of FDI flows and in their interactions with GERD, but outward FDI stocks do not appear to be influenced by the initial conditions for the cross-country regressions as reported in equation (2). The ‘goodness of fit’ measured by adjusted R-squared is low for these equations relating the Barro time-invariant initial effects compared to equations (4) to (6) which focus on the importance of country-specific idiosyncratic fixed effects rather than the Barro initial effects. The country-specific effects proxies by the constant term are significant for all the equations. The inward stocks of FDI (FDII) in equation(4) and the outward stocks of FDI (FDIO) are by themselves not significant, but they appear significant as a conduit for activating R&D as the interaction term FDI*GERD are significant for all the equations (4) to (6). Besides, domestic policy variables such expansionary monetary policy as shown by the coefficient for inflation (INFL) appears to have positive effects of on the TFP spillovers through the FDI*GERD interaction effects. An FDI friendly policy environment appears to play an important role in determining the TFP spillovers according to estimates focusing on the country-specific fixed effects in equations (4) to (6) in Table 9.

Concluding observations and policy perspectives.

The panel date econometric analysis undertaken in this paper focusing attention directly of the nexus between TFP and FDI inward and outward stocks for 25 OECD economies over a 25 year period (1983-2007) provide overwhelming support for the mainstream macroeconomic model hypotheses enunciated both by neoclassical and endogenous growth theories that FDI inflows and outflows generate technological spill overs and increase total factor productivity and therefore acts as an engine of growth in advanced countries. Advanced countries are not constrained by thresholds
constraints imposed by deficiency of human capital due to scarcity of skilled workers, or due to underdeveloped banking and financial institutions, lack of adequate infrastructure, and proper enforcement of property rights that plague developing countries and undermine their absorptive capacity and skill development, lack of law and order, endemic corruption.

National concerns relating to Dutch disease effects and global concerns as articulated in Kyoto protocol and the findings of climate scientists that highlight the need to restrict carbon dioxide emissions in order reduce the dangers of global warming. Negative externalities due to mining of non-renewable resources or Dutch disease effects, environmental degradation and outsourcing of services and their negative externalities are important issues that have not been addressed in this paper.

In this paper we study the impact of both inward and outward FDI on economic growth in the OECD countries using panel data estimation for the period 1980-2004. The main findings of our study are that both inward and outward FDI positively contribute to economic growth in the OECD. However, the impact of FDI in economic growth is moderate. Coefficients for all other variables in the cross-country regression model have the expected signs. Recent studies (e.g. (Golub, 2003a) and(Golub, 2003b), (Ghosh, 2007 June) suggest tremendous potential for growth in the flows of FDI across OECD countries through reduction of barriers. Our regression results indicate that the implications for economic growth from these are however moderate.

Contrary to earlier findings, essentially on developing countries, that the positive impact of FDI is conditional on countries’ stock of human capital or a threshold absorptive capacity, our results from OECD data find that FDI exert positive influence on both host and source country economic growth irrespective of any threshold requirements. This is not surprising as our sample only includes the developed economies which have already reached a threshold level of human capital stock or the level of R&D.

A major contribution of this study is the provision of empirical information on how to reconcile the conflicting objectives of austerity (spending cuts) through the increase TFP or more output with less inputs, with the objectives of growth that is generated by cross-border FDI flows. The conflicting objectives of austerity and growth are two sides of the same coin required to steer the sovereign debt ridden PIGS from imploding the single currency union and the euro zone. The crisis contagion from the collapse of the euro zone will not only have negative spillover effects on the OECD countries but also on the global economy.
References


APPENDIX – PANEL DATABASE OECD (Not for publication due to space constraints)

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- **GDP Per Capita**: Gross Domestic Product per Capita
- **Employment**: Employment Rate
- **Unemployment**: Unemployment Rate
- **Inflation**: Annual Inflation Rate
- **GDP Growth**: GDP Growth Rate
- **Trade Balance**: Trade Balance
- **Current Account Balance**: Current Account Balance
- **Fiscal Balance**: Fiscal Balance
- **External Debt**: External Debt
- **Rating**: Credit Rating

This table provides a snapshot of key economic indicators for selected OECD countries, focusing on Total Factor Productivity (TFP) and various economic metrics.
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Perspectives on Total Factor Productivity and Foreign Direct Investment in OECD Countries based on Panel Data Econometrics
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**Note:** GDP stands for Gross Domestic Product, Population for the number of inhabitants in millions, GDP per Capita for GDP per person, Population Density for the number of people per square kilometer, Net Exports for exports minus imports, Net Imports for imports minus exports, and Trade Balance for the difference between exports and imports.
Perspectives on Total Factor Productivity and Foreign Direct Investment in OECD Countries based on Panel Data Econometrics

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Perspectives on Total Factor Productivity and Foreign Direct Investment in OECD Countries based on Panel Data Econometrics
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### Perspectives on Total Factor Productivity and Foreign Direct Investment in OECD Countries
Based on Panel Data Econometrics

**New Zealand**
- GDP: 0.055 billion
- GDP per capita: 195004.7965
- FDI: 17203.73
- TFP: 63054.57
- TFP ratio: 150.693

**Norway**
- GDP: 0.1076 billion
- GDP per capita: 123285.87
- FDI: 460788.31
- TFP: 17203.73
- TFP ratio: 150.693

**Portugal**
- GDP: 0.2411 billion
- GDP per capita: 3321500.12
- FDI: 6707.74
- TFP: 164.804
- TFP ratio: 150.693

**Spain**
- GDP: 0.5983 billion
- GDP per capita: 394568.55
- FDI: 6707.74
- TFP: 164.804
- TFP ratio: 150.693

**Sweden**
- GDP: 0.6799 billion
- GDP per capita: 167956.27
- FDI: 14797.16
- TFP: 164.804
- TFP ratio: 150.693

**Switzerland**
- GDP: 0.6997 billion
- GDP per capita: 187280.07
- FDI: 14797.16
- TFP: 164.804
- TFP ratio: 150.693

**Turkey**
- GDP: 0.9563 billion
- GDP per capita: 1139155
- FDI: 187280.07
- TFP: 14797.16
- TFP ratio: 150.693

**United Kingdom**
- GDP: 1.0966 billion
- GDP per capita: 26756.37
- FDI: 47845.15
- TFP: 14797.16
- TFP ratio: 150.693

**United States**
- GDP: 3.6597 billion
- GDP per capita: 83465.65
- FDI: 14797.16
- TFP: 14797.16
- TFP ratio: 150.693

**Australia**
- GDP: 2.0724 billion
- GDP per capita: 14797.16
- FDI: 14797.16
- TFP: 14797.16
- TFP ratio: 150.693

**Austria**
- GDP: 1.4986 billion
- GDP per capita: 14797.16
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**Belgium**
- GDP: 0.8779 billion
- GDP per capita: 14797.16
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- TFP: 14797.16
- TFP ratio: 150.693

**Canada**
- GDP: 2.0724 billion
- GDP per capita: 26756.37
- FDI: 47845.15
- TFP: 14797.16
- TFP ratio: 150.693

**Denmark**
- GDP: 0.3699 billion
- GDP per capita: 26756.37
- FDI: 47845.15
- TFP: 14797.16
- TFP ratio: 150.693

**Finland**
- GDP: 0.0596 billion
- GDP per capita: 26756.37
- FDI: 47845.15
- TFP: 14797.16
- TFP ratio: 150.693

**France**
- GDP: 0.6487 billion
- GDP per capita: 26756.37
- FDI: 47845.15
- TFP: 14797.16
- TFP ratio: 150.693

**Germany**
- GDP: 0.2936 billion
- GDP per capita: 26756.37
- FDI: 47845.15
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- TFP ratio: 150.693

**Greece**
- GDP: 0.5369 billion
- GDP per capita: 26756.37
- FDI: 47845.15
- TFP: 14797.16
- TFP ratio: 150.693

**Iceland**
- GDP: 0.2164 billion
- GDP per capita: 26756.37
- FDI: 47845.15
- TFP: 14797.16
- TFP ratio: 150.693

**Ireland**
- GDP: 0.2411 billion
- GDP per capita: 26756.37
- FDI: 47845.15
- TFP: 14797.16
- TFP ratio: 150.693

**Italy**
- GDP: 0.6799 billion
- GDP per capita: 26756.37
- FDI: 47845.15
- TFP: 14797.16
- TFP ratio: 150.693

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**Note:** All data is hypothetical and for illustration purposes only. Real-world data and statistics may vary significantly.
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Touristic Investments in Saranda Region

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Development of tourism, in general presuppose completing of significant capital investment by the state and the private sector. Many times, it happens that investments done by the state and private sector for the touristic development, of a country, or of a region are not enough for the development of tourism. In such a situation, it helps foreign investments, which help touristic sector completing the touristic offer. Touristic investments are the second essential element of general expenditure after the touristic consume. The purpose of this research study is to analyze the development of investments (public and private ones) in Saranda Region comparing them with general investments done in Albania and needs for investments in this sector. The given data belong to: Municipality of Saranda, INSTAT, Annual book of Statistics, Ministry of Tourism and Bank of Albania. Making a comparative analyze, we reached the conclusions that, to have the development of tourism, we required not only private investments, but even public investments and a strong collaboration between private and public sector.

Keywords: touristic infrastructure and superstructure, public investments, private investments

JEL Classification: L83, H54, J61

Introduction

Economy of tourism in Albania after ‘90 has done a considerable effort for massive tourism in the whole country, applying projects to develop friendly spaces for the development of tourism, to prevent concentration of tourism in the same regions and the whole country. Ministry of Tourism has declared new objectives about Albanian tourism because tourism it may consist on sand, sea,
and sun, but it should be concentrated in all 4 seasons and all regions of the country.

Central government, as well as local government, has undertaken a new high policy to expend the tourism sector seeing tourism as a way for development, transformation and empowering of economy. Economic role of tourism is complex because tourism is an amalgam of such industries as are, transport, housing, food, drinks, service, entertainment and travel agencies. Tourism it offers many possibilities for the sustainable economic development in the country. The increasing number of visitors and the profile of nowadays traveler are looking for change and enriching the touristic product offered to country and the development of respective infrastructure. In world literature is treated the close relationship that exists between tourism and tourist Investments, private and public, Triantafyllopoulos (2006); Gezici, F. et al., (2006); Stan, R.E. et al., (2009); Andergassen, R. & Candela, G. (2010); Kort, M. P. et al., (2002); Manente, M. & Zanette, M. (2010).

Development of tourism in general presupposes the realization of significant capital Investments by the state and by the private sector. Public Investments are necessary for the execution of the objects of tourist infrastructure, while private initiative Investments are necessary for the execution of the objects of tourism superstructure. Therefore when it comes to tourism, it definitely means parallel investees activity in tourism. Ηγουμενακης, N., et al (1999).¹

Investment in the tourism sector is a mixing of public and private resources that create difficulties for the assessment of economic effects and designation of a suitable strategy. Investment of infrastructure is of a great importance. Knowledge about their attributes is the essential contribution and a better programming of touristic development. Creation of a touristic infrastructure network distinguishes the tourism product, improve the touristic image of the country and promote the process of touristic development. Improvement of infrastructure qualities and services in the tourism sector, diversification of the offered touristic product are the basic instructions in Albania. Diversification of touristic product has the main purpose the extension of touristic period and can be included among the main objectives of touristic policies. As the result of infrastructure created, specialist classified the tourism forms as of the primary importance based on the resources we

possess. In the first part, I do a theoretical description of touristic infrastructure as a component of touristic offer. In the second part, I introduce the importance of touristic investments for the development of tourism in Albania. The third and the fourth part is a case study of Saranda Region touristic investments divided into: private investments (foreign and domestic ones) and public investments into infrastructure of welcoming structures and completing structures compared with actual needs and touristic demand with needs and defined objectives in the long term strategic plan of country development. In the last section, I gave conclusions and recommendations how to do investments in the tourism field in, Saranda Region, in order to have a sustainable development of tourism and economy in this region.

**The role of touristic infrastructure as a component of touristic component**

Infrastructure is the third component of touristic offer, after the touristic resources and touristic accommodation where we base tourism policies. Touristic infrastructure not only enforce general existent infrastructure of the country, but also helps touristic development of different areas and helps in completing of touristic needs. Tourism is characterized by high costs of touristic infrastructure and superstructure.

Heytens J. (1974)² distinguish three main categories of touristic investments:

- Investments from which there are no touristic incomes, where we can mention infrastructure planning etc.
- Investments from which comes indirect touristic incomes, such are water supply, distribution of electricity power, vehicle roads, airports, touristic advertisements financed by hotel and flight companies etc.
- Investments from which we get direct touristic incomes such are hotels, restaurants, pools, tennis fields, taxies entertainment centers etc.

These investments are financed by different investors who are collaborating to assess existent touristic resources. The two first categories belong to the state, despite the fact that, for the second category, there is collaboration between the state and private investors, meanwhile the third category it belongs exclusively to the private sector. The cost for any object of the infrastructure seems to be extremely high, and this fact create a total cost for the infrastructure objects that are impossible to be provided by national or regional economic budgets. The main problem of touristic

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infrastructure seems to be their seasonal escalation, combined with existent financial resources, in a way to affect as little as possible the public expenses. The infrastructures analyze through the goods production and consumption and final services prism and distinguish two essential types of touristic infrastructure: Entertainment infrastructure that it facilitates the touristic activity in the leisure time. Infrastructure of macroeconomic nature, or general infrastructure, which aims to satisfy as many as possible consumers categories such is the transport, distribution of electricity power, drainage channels etc. Financing of the first element belong both to private and public sector. The capital expenses of the first infrastructure category can be classified as positive ones for the level used by domestic population. In many developed countries, entertainment object seems to have the entire focus on international tourism. Financing of the infrastructure belongs to the second category since it is extremely difficult to distinguish the general infrastructure from the touristic infrastructure of a country, provided by public sector through public taxes and public borrowings. Except the infrastructure, touristic sector is the link with investments done by the companies which produce goods and services consumed directly by the tourists, or supply the intermediate consumption.

According to Fabre P. (1979), the required investments for the touristic development of a country are of two categories:

• Investments done in businesses that sell goods and services consumed directly by the visitors
• Investments done in general infrastructure and public services.

The state contribution in touristic developments it distinguishes two main directions:

• Creation of a favoring investments atmosphere.
• The Favoring financing.

About the first direction, there are several accepted factors which are able to fulfill the requirements of the first direction, and which can be as following:

• Perspective for a complete development.
• Public announcements of touristic developing programs.
• The role of government and administrative support.
• Creation of infrastructure.

Economic efficiency of touristic accommodation depends on a high level from the initial structure of invested capitals. The nature of investments in the tourism sector brings a series of features, listed as following:

The incomes have a crucial role to the assessment of efficiency of touristic accommodation. Prices of offered services have a crucial role for the income. It requires of fix and variable operative costs, in order to have attractive prices and as a consequence to have sufficient incomes during the entire year. Occupation, duration of staying, periods of holidays, and tourist expenses are the key elements for the defining of investments efficiency. Quality of the service seems to be the most crucial factor for the tourist attraction. Constructions can represent damages in a short period, especially for the countries under development, a fact that increase the maintaining costs. Also, the effort to preserve certain parameters, creates extra problems.

Demand for long term capitals is often difficult as the result of lacking trusted methods, which are necessary to define out economic efficacy of investments in tourism field.

Tourism shows the competition effects and its clients seem sensitive towards the market changes (fashion, quality, price, etc.) These features have to do mainly with the housing sector of tourism, but affect the investments done in infrastructure recreation etc. and investments done in other economic sectors which are part of touristic production.

**The Importance of tourism and touristic investments for Albania.**

Erbes R.(1973) stresses the fact, in connection with tourism “It is a heavy industry”, if we talk about investments because tourism does not represent real sector of the economy, but a set of activities subordinated by different sectors and branches (transport, construction, public objects etc). Development of tourism in general presupposes completing of crucial investments of capitals by the public and private sector.

Many times, it happens that the investments done by the public and private sector that have in consideration the touristic development of a country or, of a region are insufficient for the tourism development. In such a situation, the focus is on foreign investments in order to reach the goals. The role of tourism in Albania development is crucial.

Direct contribution of tourism in GDP during the year 2011 in Albania it was 81.4 billion ALL, or 6.2% of GDP. The total contribution of tourism in

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GDP during 2011 in Albania it was 287.9 billion ALL, or 21.8% of GDP. Capital investments in the tourism sector, in Albania during 2011 have been 21.0 billion ALL. At Graph 1, I introduced contribution of trade sector, hotels and restaurants for the growing of GDP in Albania for the period 2001-2010.

**Graph 1:** The contribution of tourism in the real growth of GDP in Albania

Source: INSTAT Albania

At graph 2, I introduced the capital investments done in the tourism field using the real prices of 2011 for the period 2006-2011 in billion ALL.

**Graph 2:** Capital investments in tourism in Albania

Source: Travel&Tourism Economic Impact 2012, Albania

**Graph 3:** Total foreign investments and foreign investments in hotels and restaurants.

Source: Central Bank of Albania
In 2011, capital investments done in the tourism field, in Albania 0.2 billion US$, in Europe 187.3 billion US$, and in the whole world 743 billion US$. Contribution of capital investments in tourism filed in Albania during 2011 it was 4.8% (graph 5) meanwhile the world average for the same period it was 8.3% (graph 4) while the long term prediction for the year 2022 for the contribution of capital investments in the tourism field in Albania will be 4.6% and the world average it will be 5.3%.

**Graph 4:**

![Part of capital investments in tourism in the World for 2011](image)

**Graph 5:**

![Part of capital investments in tourism in Albania for 2011](image)

Source: Travel&Tourism:Economic Impact 2012, Albania

The role of tourism, effect of public investments in tourism, development of private investments in tourism sector of Saranda region.

Saranda region is in the southern part of Albania. Saranda it has natural resources and is at the same time the meeting point of many cultures and many religions. It possesses a rich archeological and cultural heritage. Saranda is a region with cultural assets and values of antiquity monuments. This region has the greatest number of cultural monuments in Albania and the greatest potentials and resources for the development of historical, natural and cultural tourism. Saranda Region possesses 116 natural assets and assets of cultural heritage. In Saranda region there is the ancient city of Butrint. Saranda is directly depended on tourism if we take in consideration the level of incomes gained from this sector. Tourists that visit Saranda are the main sources of incomes. Tourism industry is exclusively focusing on private sector. Number of tourists that have visited Albania during the period 2005-2011 consist in 20% of tourists who have visited. At Graph 6 is introducing the number of tourists who have visited Albania and number of tourists who have visited Saranda region for the period 2005-2011. At graph 7 is introducing the weight it has a number of tourists who visited Albania in the total number of visitors who
visited Albania during the period 2005-2011.

**Graph 6:** Tourists who have visited the Saranda region and Albania.  
Source: Ministry of Tourism, Youth, Culture and Sports, Albania

**Graph 7:** Weight emphasis tourists visited Saranda to tourists visited Albania.  
Source: Ministry of Tourism, Youth, Culture and Sports, Albania

Analyzing the private investments in tourism sectors in Saranda region, it is visible that Saranda region hold the third place behind the Tirana and Durres Regions if we compare the number of accommodation unit of all regions of Albania. Accommodation units, of Saranda region, consist in 10.3% of the whole accommodation units in Albania, number of rooms consist in 9.6% of the total number of the hotel rooms in Albania and 10.4% of the total hotel beds, in Albania. Table 1 gives the weights that have hotels in Saranda region according to the number of rooms for 2011

**Table 1:** Hotels grouped according to rooms.

<table>
<thead>
<tr>
<th>Number of hotel rooms</th>
<th>Percentage of the total number of hotels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 10 rooms</td>
<td>23.6%</td>
</tr>
</tbody>
</table>
Based on the table’s data, we notice that the average number of rooms for a certain hotel in Saranda is round 18 rooms.

Graph 8 introduces the number of touristic accommodation units, number of rooms and number of beds for touristic use in Albania during 2011.

### Table: Distribution of Touristic Accommodation by Room Capacity

<table>
<thead>
<tr>
<th>Room Capacity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-20 rooms</td>
<td>51.1%</td>
</tr>
<tr>
<td>21-30 rooms</td>
<td>18.1%</td>
</tr>
<tr>
<td>31-40 rooms</td>
<td>1.8%</td>
</tr>
<tr>
<td>41-60 rooms</td>
<td>3.6%</td>
</tr>
<tr>
<td>Above 60 rooms</td>
<td>1.8%</td>
</tr>
</tbody>
</table>

Source: Ministry of Tourism, Youth, Culture and Sports, Albania

In Saranda, the rapport of the number of inhabitants with the number of beds is 17.4 inhabitants per bed meanwhile the rapport of family number with the number of hotels is 220 families per hotel. Tourism season in Saranda is characterizing by a short season that last up to 4-5 months. When the touristic season is over all the hotels close their doors. Only 11.4% of the hotels continue to function all year long; meanwhile the rest close their activities and start to reactivate it at the beginning of the touristic season.

Saranda municipality has projected middle term and long term development of the region. Municipality of Saranda invests 40% of his budget for the development of the area and public investments. Graph 9 introduces the source of incomes for public investments in Saranda region for the period 2001-2010.
Graph 9: Source of income for Public Investments
Source: Municipality of Saranda. Different indicators of local development for 2010

Most of the public investments belong to the budget of Albanian state.

Graph 10: Invenstments in public infrastructure occupy 80% of the total investments in the region of Saranda.
Source: Municipality of Saranda, 2010

The investments done by local government have helped the private sector of tourism with other policies. Hotels in Saranda region are paying 5 kind of taxes such are, tax of small business, tax of building, tax of boards, tax of sleeping, and tax of public. Local bodies have supported the hotel sector decreasing the building tax in 2005 with 30% of his total value; have decreased with 20% the tax of sleeping in 2005 and 25% in 2011. In Saranda region number of hotels, restaurants and coffee bars is increasing every day, but their weight they have in general number of such businesses in the region is decreasing.

The impact have the investments of urban and public infrastructure for the rehabilitation of road infrastructure, establishing and asphalt of public places and dwelling places, planting of trees, water supplying, lighting drainage channels etc.

During the period, 2005-2010 a road of more than 35 km was opened,
reconstructed and asphalted.

Some urban road of 132500 square m was asphalted.

There was improvement in the quality and space public lighting system. There are place 1070 new lights. In order to extend the green areas municipality planted 1700 decorative plants.

Development of tourism in Saranda region has given a prominent urge to the investments done for the construction of car roads in Saranda. The road of Coastline that connect Vlora with Saranda and passes through the coastline villages; the road Sarande – Butrint passes through Ksamil, a touristic area frequented by many visitors. The road Sarande – Qafe bote, a road that connect Saranda with Greece; these three roads are investments done by Albanian government in collaboration with World Bank and other foreign donors. Other investments, of government and other donors in infrastructure have to develop tourism in Saranda area through the following investments; cleaning, construction of sewage system, in a 12 km distance, far from the town of Saranda, it has a value of 5 million euro. It is an investment of World Bank and Albanian government. The port of goods was finished, an investment of Albanian government with a value of 3 million euro. Saranda is benefiting from the funds of World Bank from the program of Integrated Management and Cleaning of Coastline in a value of 20 million euro. Objective of this project is to help a sustainable development of the Albanian southern coastline improving the public environmental infrastructure and communal services improving architectural and cultural infrastructure. The project will support:

The construction of a damp site and a transferring station to improve the management of solid wastes at Saranda Municipality. Investments for the water supply of the Saranda town with a value of 2.5 million euro. Except the car road the tourist can reach Saranda even through the sea. Through the project of the World Bank with a value of 4.5 million Euros it will rehabilitate the road at the entrance of Saranda town, for the reconstruction of port objects in Saranda to make possible harboring of passenger cruise ships in the southern coastline. Saranda town is a frequented place by visitors who reach it’s coastline by cruise ships, private yachts, and ferry boats of the line Sarande – Corfu. Every year the number of visitors is increasing with a quick pace bringing more incomes for the area. The project for the rehabilitation of port objects will increase the number of cruise ships that will visit the region. At graph 11, is introduced the number of cruise ships processed in Saranda harbor during the period 2005-2011, while at graph 12, is introducing the number of visitors that reached the Saranda coast through the cruise ships during the same period of time.
In Saranda region the antient city of Butrint is situated, which is under the protection of UNESCO, and a place that attracts visitors from the whole world. In the project of World Bank, ”Program for the integrated management and cleaning of coastline area” Butrint is including in the project for the management of self protected areas implemented on the pilot project for the sustainable management of National Park of Butrint This park affects the economy of the region for employment and income issues. The community of the region has benefited even from the reconstruction of the infrastructure. Graph13 introduces the number of visitors in this park during the period 2005-2010.
Seasonal nature of touristic phenomena and the increase of the general consume of touristic services that are under the disposition during the period of visitors flux affect the touristic investments that are complete within the country in collaboration with following factors:

- Geographical position of the region.
- Position of touristic places.
- The situation of existent infrastructure

Graph 14 it introduces the number of tourists according to the period 2009-2011 in the region of Saranda. Here is clearly evident the seasonal character of the tourists that reach the climax in August.

Graph 14: Numri of tourists by month.
Source: Municipality of Saranda, 2011

Conclusions

During the last years, there is a progress in investments level done in Saranda region for the tourism sector, urged even from the strategy of tourism development that gave priority to investments of touristic areas. In the framework of this plan, Saranda region has absorbed a considerable part of investments done in the country. This level of investments is not sufficient to have a developed tourism and competitive in international level.

It should be done more investments by the public sector in such fields as: Investments in infrastructure, road network improvements, creation of airport, improvement of water supply system and investments in processing and recycling of urban wastes, investments that should be done by the public sector.

It should be paid a lot of importance and priority to investments in facilitating structures, which can make possible extension of touristic season, making more rentable the investments in this sector.

Rapport of foreign private investments with domestic investments is
extremely low. The state, in collaboration with the private sector, should urge and create a favorable atmosphere, for the foreign investments, which have possibilities to do greater capital investments than those done by the domestic investors.

The increasing demand to visit Saranda should find a reaction by touristic offer in this sector, which can be able to complete these demands from the quantity point of view and the qualitative point of view.

The shortness of tourism period has an extra demand during the period July- August and under the use of existent infrastructure during the rest of the year. It is recommending the extension of touristic infrastructure and reducing of seasonality through the adding of alternative forms of tourism.

The touristic demand by the Albanian pupils and students in the period May-June is high, and this gives a better possibility to spread the demand all over the year.

Natural and cultural heritage is a competitive advantage for the Saranda region, so as a touristic destination, when are building up new touristic objects should be taken in consideration the followings:

a) To preserve balancing of dwelling place system and establishments of rural areas
b) Preservation of the natural environment and protection of the cultural heritage

Touristic objects build up in the region are new ones, and as the result, investments for the improving of existent objects are in low levels. Policies of regional development in Albania have helped in considerable number touristic projects that have brought the changes of regional touristic infrastructure.

This is based on the fact that the amounts of the help, amount of general investments are at high levels and they affect the placement of the tourism industry model in Saranda region.

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[23] www.instat.gov.al
Study of Competitiveness for the Representative Companies in the National Domestic Dairy

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Isabella Sima, Academy of Economic Studies Bucharest, Romania, i_onescu@yahoo.com

To study the competitiveness of a company we use several indicators $I_1, I_2, \ldots, I_n$ that can be expressed numerically. We note $E_1$ the company whose competitiveness we want to evaluate. It can action several markets, but we will focus on one of them, where it competes with the companies $E_2, E_3, \ldots, E_m$. Firstly, we aim to achieve the firms’ hierarchy operating on that market with ELECTRE method. Then we will see how to obtain the classification of these companies based on competitiveness’index method.

Keywords: competitiveness, classification, Electre method, competitiveness index method

JEL Classification: C02, C38, C43

Introduction

Prior to a discussion of the two classifications obtained below, we dedicate the followings to a comparative analysis for the methods applied: ELECTRE method and method of competitiveness’index.

ELECTRE method provides good results in multi criteria decision. For some aggregations and comparisons required by the algorithm are necessary uniform criteria, which is done by transforming the recorded values of indicators of the companies in utilities.

Also the utilities of indicators have a comparative feature, since the scale of values includes only the values recorded for the companies concerned, and not related to standard values. The method is complex: the first phase is achieved by comparing the companies by concordance indices; to assume that
a firm is dominant for another, it is necessary that the opposition to this choice, the risk must be quite low, which means the discordance index to be limited, finally, after setting all the relations of domination, the tie breaker is upon the number of firms dominated. This mechanism of laborious classification assures a better accuracy for results.

The competitiveness'index method provides good results for the analysis of competitiveness. Method means to assign one value to each enterprise. This value, even if it does not require a complicated calculation, is representing properly the recorded values for all indicators with their shares (coefficients of importance). Competitiveness index value is a measure of competitiveness' degree of the company. Also noted that competitiveness index method, is outstanding by its natural way of evaluating the level of competitiveness.

In general, the classifications obtained by the two methods may differ, but not too much, which happens in this case. This does not mean that the two classifications exclude one to another.

They are obtained based on different criteria, so that they complement each other and must be considered together.

Competitiveness index aggregates utility's values for all indicators. It represents level of competitiveness without highlighting the results' values for each indicator. In this method, the low results for one or more indicators for a company don't influence good scores on other indicators. Therefore, such a classification is based on qualitative criteria.

Classification by ELECTRE method has qualitative aspects. This time, the values for each indicator enter into play separately. Therefore, if for a company the values obtained for a limited number of indicators (enough, perhaps only one) are very unfavorable, even if for several indicators are very favorable, then some indices of discordance have high values, which determine the company not to be able to dominate the companies corresponding to these indices and classifies it in a lower position.

**Methodology**

For this study, we consider the most important suppliers of dairy products in Romania, companies rated in Top 10 dairy suppliers by turnover:

- SC Danone P.D.P.A. - $E_1$;
- Whiteland Import - Export - $E_2$;
- SC Friesland Romania - $E_3$;
- SC Napolact S.A. - $E_4$;
Study of Competitiveness for the Representative Companies in the National Domestic Dairy

- SC Albalact S.A. - \( E_5 \);
- SC Hochland Romania - \( E_6 \);
- SC Delaco Distribution S.A. Brasov - \( E_7 \);
- SC Dorna Lactate S.A. - \( E_8 \);
- SC Milk Industrialization Mures - \( E_9 \);
- SC Trd. Tnuva Romania Dairies SRL - \( E_0 \).

Would be preferable to analyze the competitiveness of these companies based more a complete set of indicators. The lack of data determined us to dwell on the following economic indicators that characterize sufficiently the competitiveness of companies:

\[
\begin{align*}
N_{2009} & = \text{number of employees in } 2009 - I_1; \\
CA_{2009} & = \text{net turnover in } 2009 - I_2; \\
P_{2009} & = \text{net profit/net loss in } 2009 - I_3; \\
R_{2009/2008} & = \frac{CA_{2009} - CA_{2008}}{CA_{2008}} = \text{exchange rate/turnover in } 2009 \text{ compared to } 2008 \text{ (relative variation of turnover)} - I_4; \\
r_{2009} & = \frac{P_{2009}}{CA_{2009}} = \text{net profit rate in } 2009 \text{ (share of net profit in turnover)} - I_5; \\
Q_{2009} & = \frac{CA_{2009}}{N_{2009}} = \text{labor productivity in } 2009 - I_6.
\end{align*}
\]

The 10 companies registered the following values for the Indicators considered above:

**Table 1:** Top 10 suppliers of dairy products by turnover in 2009

<table>
<thead>
<tr>
<th>No</th>
<th>Company</th>
<th>( N_{2009} )</th>
<th>( CA_{2009} ) (L)</th>
<th>( P_{2009} ) (L)</th>
<th>( R_{2009/2008} )</th>
<th>( r_{2009} )</th>
<th>( Q_{2009} ) (L/employee)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S.C. Danone P.D.P.A. (E₁)</td>
<td>709</td>
<td>434,6</td>
<td>27,24</td>
<td>2,79</td>
<td>6,27</td>
<td>0,6130</td>
</tr>
<tr>
<td>2</td>
<td>Whiteland Import - Export (E₂)</td>
<td>423</td>
<td>372,87</td>
<td>1,99</td>
<td>10,48</td>
<td>0,53</td>
<td>0,8815</td>
</tr>
<tr>
<td>3</td>
<td>S.C. Friesland Romania (E₃)</td>
<td>674</td>
<td>284,41</td>
<td>1,2</td>
<td>-10,64</td>
<td>0,42</td>
<td>0,4220</td>
</tr>
</tbody>
</table>
To study the competitiveness of firms we use the method ELECTRE and method competitiveness'index.

The application of these methods requires firstly transforming the values of indicators obtained by the companies $R_{ij}$ (Table Top 10 suppliers of dairy products by turn over in 2009) in utilities using linear interpolation.

Because for all the indicators we considered that the most favorable values are the biggest ones, utilities’ determination is performed using formula

$$u_i = \frac{R_{ij} - R_{\text{min}}}{R_{\text{max}} - R_{\text{min}}}, \text{ } i = 1,2,\ldots,m.$$

This implies the following table:

<table>
<thead>
<tr>
<th>$I_j / E_i$</th>
<th>$I_1$</th>
<th>$I_2$</th>
<th>$I_3$</th>
<th>$I_4$</th>
<th>$I_4$</th>
<th>$I_6$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$E_1$</td>
<td>0,9181</td>
<td>1,0000</td>
<td>1,0000</td>
<td>0,5305</td>
<td>0,9554</td>
<td>0,6012</td>
</tr>
<tr>
<td>$E_2$</td>
<td>0,2854</td>
<td>0,8209</td>
<td>0,7944</td>
<td>0,7590</td>
<td>0,9067</td>
<td>1,0000</td>
</tr>
<tr>
<td>$E_3$</td>
<td>0,8407</td>
<td>0,5642</td>
<td>0,7880</td>
<td>0,1314</td>
<td>0,9058</td>
<td>0,3174</td>
</tr>
<tr>
<td>$E_4$</td>
<td>0,2102</td>
<td>0,4159</td>
<td>0,9497</td>
<td>0,3453</td>
<td>0,9789</td>
<td>0,5814</td>
</tr>
</tbody>
</table>

Table 2: Matrix utilities
Next we have to decide the importance of each indicator, which means to determine the indicators’ coefficients of importance. In this respect, after consulting several specialists about coefficients of importance of indicators, the following values were obtained:

<table>
<thead>
<tr>
<th>Economic indicators $I_j$</th>
<th>$I_1$</th>
<th>$I_2$</th>
<th>$I_3$</th>
<th>$I_4$</th>
<th>$I_5$</th>
<th>$I_6$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient of importance $K_j$</td>
<td>0.07</td>
<td>0.10</td>
<td>0.16</td>
<td>0.22</td>
<td>0.19</td>
<td>0.26</td>
</tr>
</tbody>
</table>

Analyzing the table above, we note the big values attributed to the coefficient of importance of rate of exchange in turnover and to coefficient of importance of labor productivity. The first of the two indicators expresses the evolution of the company in time, which implies the high value of the coefficient of importance which corresponds to 0.22. The second indicator, in some way synonymous with competitiveness is even more important, reason for which has the highest coefficient of importance 0.26. The high importance of this indicator is justified by the fact that the overall objective of the Operational Sectorial Program the Economic Competitiveness Growth (P.O.S. C.C.E.) is the productivity growth of Romanian companies in order to reduce...
productivity gaps with the EU average, the target is an average annual increase
in productivity per employee with about 5.5%, which allows to achieve a level
of about 55% of the EU average in 2015.

However, the rate of net profit and net profit/net loss have slightly
lower shares compared with the indicators mentioned earlier, but considerably
higher than the turnover and, especially, the number of employees. Net income
is an important indicator that show show effective the economic activity is, but
its size depends on the company’s development policy, the share of income
for investment. For these reasons, to the rate of net profit and net profit/net
loss were associated average coefficients of importance, relative to the shares
given range.

We have the information necessary to calculate indices of
competitiveness, but to apply the ELECTRE method must also determine
the concordance indices and discordance indices. With these indices the
companies are classified using the algorithm presented.

Determination of concordance index between the companies $E_g$
and $E_h$ noted $C(E_g, E_h)$, is based on formula

$$C(E_g, E_h) = \sum_{j \in J} K_j$$

$g=1,2,\ldots,m$, $h=1,2,\ldots,m$, $g \neq h$, $J = \{ j \in \{1,2,\ldots,n\} | u_{gj} \geq u_{hj} \}$

So we obtain the table of concordance indices:

<table>
<thead>
<tr>
<th>$E_h / E_g$</th>
<th>$E_1$</th>
<th>$E_2$</th>
<th>$E_3$</th>
<th>$E_4$</th>
<th>$E_5$</th>
<th>$E_6$</th>
<th>$E_7$</th>
<th>$E_8$</th>
<th>$E_9$</th>
<th>$E_0$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$E_1$</td>
<td>-</td>
<td>0,52</td>
<td>1,00</td>
<td>0,81</td>
<td>0,59</td>
<td>1,00</td>
<td>1,00</td>
<td>0,71</td>
<td>1,00</td>
<td>1,00</td>
</tr>
<tr>
<td>$E_2$</td>
<td>0,48</td>
<td>-</td>
<td>0,93</td>
<td>0,65</td>
<td>0,36</td>
<td>0,65</td>
<td>0,65</td>
<td>0,71</td>
<td>1,00</td>
<td>1,00</td>
</tr>
<tr>
<td>$E_3$</td>
<td>0,00</td>
<td>0,07</td>
<td>-</td>
<td>0,17</td>
<td>0,43</td>
<td>0,17</td>
<td>0,17</td>
<td>0,71</td>
<td>1,00</td>
<td>0,78</td>
</tr>
<tr>
<td>$E_4$</td>
<td>0,19</td>
<td>0,35</td>
<td>0,83</td>
<td>-</td>
<td>0,36</td>
<td>1,00</td>
<td>0,78</td>
<td>0,71</td>
<td>1,00</td>
<td>0,78</td>
</tr>
</tbody>
</table>

Table 4: Matrix of concordance indices
Discordance index between two companies $E_g$ and $E_h$ is calculated by formula:

$$D(E_g, E_h) = \begin{cases} 0, & \text{daca } u_{g,k} \geq u_{h,k}, \forall j \in \{1,2,\ldots,n\} \\ \max_{j \in I_h \setminus I_g} |u_{g,k} - u_{h,k}|, & g \neq h, \quad I_h = \{j \in \{1,2,\ldots,n\} | u_{g,k} < u_{h,k}\} \\ h = 1,2,\ldots,m, & g = 1,2,\ldots,m' \end{cases}$$

Results the following table:

<table>
<thead>
<tr>
<th>$E_h$ / $E_g$</th>
<th>$E_1$</th>
<th>$E_2$</th>
<th>$E_3$</th>
<th>$E_4$</th>
<th>$E_5$</th>
<th>$E_6$</th>
<th>$E_7$</th>
<th>$E_8$</th>
<th>$E_9$</th>
<th>$E_{10}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$E_1$</td>
<td>-</td>
<td>0,3988</td>
<td>0,0000</td>
<td>0,0235</td>
<td>0,4695</td>
<td>0,0000</td>
<td>0,0000</td>
<td>0,2543</td>
<td>0,0000</td>
<td>0,0000</td>
</tr>
<tr>
<td>$E_2$</td>
<td>0,6327</td>
<td>-</td>
<td>0,5553</td>
<td>0,1553</td>
<td>0,3009</td>
<td>0,0377</td>
<td>0,0437</td>
<td>0,7146</td>
<td>0,0000</td>
<td>0,0000</td>
</tr>
<tr>
<td>$E_3$</td>
<td>0,4358</td>
<td>0,6826</td>
<td>-</td>
<td>0,2640</td>
<td>0,8686</td>
<td>0,2349</td>
<td>0,3842</td>
<td>0,6534</td>
<td>0,0000</td>
<td>0,3435</td>
</tr>
<tr>
<td>$E_4$</td>
<td>0,7079</td>
<td>0,4186</td>
<td>0,6305</td>
<td>-</td>
<td>0,6547</td>
<td>0,0000</td>
<td>0,1703</td>
<td>0,7898</td>
<td>0,0000</td>
<td>0,1296</td>
</tr>
<tr>
<td>$E_5$</td>
<td>0,6053</td>
<td>0,7089</td>
<td>0,2544</td>
<td>0,2903</td>
<td>-</td>
<td>0,2612</td>
<td>0,1464</td>
<td>0,4137</td>
<td>0,0000</td>
<td>0,0000</td>
</tr>
</tbody>
</table>

Table 5: Matrix of discordance indices
The algorithm establishing relations of domination, has disadvantages related to the time of execution, repeated crossing of matrix of concordance indices and matrix of discordance indices and successively decreasing the concordance limit.

Therefore, to achieve dominance relationships between firms, we use another algorithm, which is faster and more efficient and which, moreover, can be easily implemented in a programming soft. Thus, the companies’ ranks are established directly using concordance and discordance indices.

We consider two firms \( E_g \) and \( E_h \). If \( E_g \) is higher ranked than \( E_h \), which means \( C(E_g, E_h) \geq p \) and \( D(E_g, E_h) \leq 1 - p \), where \( 0 < p \leq 1 \), we note \( p_1 \) the maximum value of acceptability \( P \). It can be shown that for limit determination, \( p_1 \) we have:

- if \( C(E_g, E_h) + D(E_g, E_h) \geq 1 \), then \( p_1 = 1 - D(E_g, E_h) \);
- if \( C(E_g, E_h) + D(E_g, E_h) < 1 \), then \( p_1 = C(E_g, E_h) \).

To validate ranking relationship, is necessary, as I said earlier, \( p_1 > p^* \).

We note \( p_2 \) the maximum value of acceptability limit when \( E_g \) is lower ranked than \( E_h \). To obtain the limit \( p_2 \) we have:

- if \( C(E_h, E_g) + D(E_h, E_g) \geq 1 \), then \( p_2 = 1 - D(E_h, E_g) \);
- if \( C(E_h, E_g) + D(E_h, E_g) < 1 \), then \( p_2 = C(E_h, E_g) \). Once determined \( p_1 \) and \( p_2 \), the following conditions exist:

---

1. if \( p_1 > p_2 \) and \( p_1 > p^* \), then \( E_g \) dominates \( E_h \);

2. if \( p_2 > p_1 \) and \( p_2 > p^* \), then \( E_h \) dominates \( E_g \);

3. So, there is no dominancerelationshipbetween the two companies

In conclusion, in determining dominances relations we do so:
for \( g = \overline{m-1} \) and for \( h = g + 1, m \) is determined \( p_1 \) and \( p_2 \) asearlier;
comparing \( p_1 \), \( p_2 \) and \( p^* = 0,2 \) we reach one of the situations 1), 2) or 3) from above, which leads correspondingly to \( E_g > E_h \), \( E_h > E_g \) or to the absence of a relationship of domination. Using the above algorithm, we find the following relations of domination:

### Table 6: Domination Relations

<table>
<thead>
<tr>
<th>Company ( E_i )</th>
<th>Domination relations of the company ( E_i )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( E_1 )</td>
<td>( E_1 &gt; E_2, E_1 &gt; E_3, E_1 &gt; E_4, E_1 &gt; E_5, E_1 &gt; E_6, E_1 &gt; E_7, E_1 &gt; E_8, E_1 &gt; E_9, E_1 &gt; E_0 )</td>
</tr>
<tr>
<td>( E_2 )</td>
<td>( E_2 &gt; E_3, E_2 &gt; E_4, E_2 &gt; E_5, E_2 &gt; E_6, E_2 &gt; E_7, E_2 &gt; E_8, E_2 &gt; E_9, E_2 &gt; E_0 )</td>
</tr>
<tr>
<td>( E_3 )</td>
<td>( E_3 &gt; E_8, E_3 &gt; E_9, E_3 &gt; E_0 )</td>
</tr>
<tr>
<td>( E_4 )</td>
<td>( E_4 &gt; E_3, E_4 &gt; E_6, E_4 &gt; E_7, E_4 &gt; E_9, E_4 &gt; E_0 )</td>
</tr>
<tr>
<td>( E_5 )</td>
<td>( E_5 &gt; E_3, E_5 &gt; E_4, E_5 &gt; E_6, E_5 &gt; E_7, E_5 &gt; E_8, E_5 &gt; E_9, E_5 &gt; E_0 )</td>
</tr>
<tr>
<td>( E_6 )</td>
<td>( E_6 &gt; E_3, E_6 &gt; E_9, E_6 &gt; E_0 )</td>
</tr>
<tr>
<td>( E_7 )</td>
<td>( E_7 &gt; E_3, E_7 &gt; E_6, E_7 &gt; E_9, E_7 &gt; E_0 )</td>
</tr>
<tr>
<td>( E_8 )</td>
<td>( E_8 &gt; E_4, E_8 &gt; E_6, E_8 &gt; E_7, E_8 &gt; E_9, E_8 &gt; E_0 )</td>
</tr>
</tbody>
</table>
Based on these domination relations, we can draw the following hierarchy:

**Table 7**: Hierarchy of companies by ELECTRE method:

<table>
<thead>
<tr>
<th>No. crt.</th>
<th>Company</th>
<th>Number of companies which are dominated</th>
<th>Number of companies by which is dominated</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S.C. Danone P.D.P.A. ((E_1))</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Whiteland Import – Export ((E_2))</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>S.C. Albalact S.A. ((E_5))</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>4-5</td>
<td>S.C. Napolact S.A. ((E_4))</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>4-5</td>
<td>S.C. Dorna Lactate S.A. ((E_8))</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>S.C. Delaco Distribution S.A. Braşov ((E_7))</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7-8</td>
<td>S.C. Friesland Romania ((E_3))</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>7-8</td>
<td>S.C. Hochland Romania ((E_6))</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>9</td>
<td>S.C. MilkIndustrializationMures ((E_9))</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>10</td>
<td>S.C. Trd. Tnuva Romania Dairies S.R.L. ((E_0))</td>
<td>0</td>
<td>9</td>
</tr>
</tbody>
</table>

With the utilities and the coefficients of importance from above tables are calculated indices of competitiveness of companies by formula

\[ C_i = \sum_{j=1}^{n} u_j K_j, \quad i = 1, 2, ..., m \]

Descending ordering the indices of competitiveness of firms, we obtain the following table classification:
Table 8: Hierarchy of companies by competitiveness index

<table>
<thead>
<tr>
<th>No..crt.</th>
<th>Company</th>
<th>Competitiveness index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Whiteland Import – Export (E₂)</td>
<td>0,828425</td>
</tr>
<tr>
<td>2</td>
<td>S.C. Danone P.D.P.A. (E₁)</td>
<td>0,778815</td>
</tr>
<tr>
<td>3</td>
<td>S.C. Albalact S.A. (E₅)</td>
<td>0,724629</td>
</tr>
<tr>
<td>4</td>
<td>S.C. Napolact S.A. (E₄)</td>
<td>0,621377</td>
</tr>
<tr>
<td>5</td>
<td>S.C. Delaco Distribution S.A. Brașov (E₁)</td>
<td>0,580139</td>
</tr>
<tr>
<td>6</td>
<td>S.C. Hochland Romania (E₆)</td>
<td>0,559437</td>
</tr>
<tr>
<td>7</td>
<td>S.C. Friesland Romania (E₂)</td>
<td>0,524883</td>
</tr>
<tr>
<td>8</td>
<td>S.C. Dorna Lactate S.A. (E₈)</td>
<td>0,522348</td>
</tr>
<tr>
<td>9</td>
<td>S.C. MilkIndustrializationMures(E₉)</td>
<td>0,351955</td>
</tr>
<tr>
<td>10</td>
<td>S.C. Trd. Tnuva Romania Dairies S.R.L. (E₁₀)</td>
<td>0,142178</td>
</tr>
</tbody>
</table>

Conclusions

Returning to the main suppliers of dairy products in 2009, we note major differences between companies in terms of all economic indicators considered (see Table).

The first two places in both rankings are divided among themselves by SC Danone P.D.P.A. and White land Import -Export, showing good results in all indicators.

Danone recorded maximum values in terms of turnover (Lei 434.6 millions) and net profit (Lei 27.24 millions), high values for the indicators: number of employees and net profit ratio and average values for the turnover ratio 2009/2008 and for labor productivity. The company occupies only the second place in ranking by index of competitiveness, with its value 0.7788150 since its recorded values for turnover relative variation and labor productivity are average, and these indicators have high coefficients of importance.

Whiteland achieved the highest productivity (0.8815 lei /employee), high value for the net profit rate, relatively high value of turnover, net profit and the exchange rate in turn over and has a small number of employees compared to other competitors in the Top 10 suppliers of dairy products by turn over in 2009. As for indicators with high coefficients of importance is recording high values, the company holds the first place in ranking by competitiveness index, index of competitiveness so 0.828425.
The company Danone occupies first place in the hierarchy of companies by ELECTRE method and the small difference between the indices of competitiveness of this company and the company Whiteland, only 0.04961 for the second, is placing the company Danone first and Whiteland firm second place in a ranking of competitiveness.

Although ranked the fifth in the hierarchy by turn over, SC Albalact S.A. occupies the third place in competitiveness index classification and in the classification by ELECTRE method, for which reason in the competitiveness rankings will be the third position. The company chose market leading products and earned a profit rate of 11.52%, the highest rate of all ten companies. However, Albalact obtained the biggest turnover growth in relative terms (18.59%) and profit one of the largest. Only labor productivity is at a lower level compared to the other nine competitors in the dairy market.

Analyzing the tables we see that the three companies we discussed earlier clearly stand out from other leading in competitiveness.

SC Napolact SA, obtained the 4-5 places in the classification by ELECTRE method and 4th place by index of competitiveness, so will rank the top 4 by competitiveness. The company achieved a high net profit and also a high net profit rate (9.03%), but its turnover declines by 3.44% over the previous year.

SC Dorna Lactate S.A. takes places 4-5 in the hierarchy obtained with ELECTRE method, surpassing 5 companies and being surpassed by 4 companies, but is placed only the 8th place in the hierarchy based on index of competitiveness, with competitiveness index 0.522348. Instead, SC Delaco Distribution S.A. Brasov is a position below, which means the 6th place in the first classification, dominating four firms and being dominated by 5 companies and has the competitiveness index 0.580139, with 0.057791 more than Dorna Lactate, occupying Ranking 5th in the other hierarchy. For these reasons, we believe that the 5th place for competitiveness is occupied by Delaco.

For SC Delaco Distribution S.A. Brasov year 2009 was a balanced one, most notably being that earned a substantial profit 7.36 million RON and registered a net profit rate of 3.90%.

On 6th place in the hierarchy of competitiveness are candidates SC Hochland Romania and SC Dorna Lactate SA, about which we discussed earlier. Hochland achieves the 7-8 places by ELECTRE method, surpassing the 3 companies and being surpassed by six companies and occupies 6th place in the other hierarchy, obtaining with 0.037089 more than its rival for the
competitiveness index, 0.559437. Since the difference between Dorna Lactate and Hochland in the first hierarchy is high enough for the first company, while the difference in the second classification is relatively small against the same company, we can award it with the 6th place in the competitiveness hierarchy. Dorna Lactate has the biggest number of employees (746), and the lowest labor productivity (0.2083 lei/employee) of the companies studied. The company also achieved a significant increase in turnover, but ended the financial year with a loss.

7-10 places in competitiveness ranking, as is easily noticed, the other companies are placed in the following order: SC Hochland Romania, SC Friesland Romania, SC Milk Industrialization Mures and SCTRDTnuva Romania Dairies. Hochland has obtained a substantial profit in 2009 and has a remarkable profit rate (3.23%), but the previous years show a slight decrease in turnover by 5%.

Friesland, despite the fact that has achieved a turnover exceeding 284.41 million RON (the third position) that has a big number of employees (674), recorded a drop in turnover compared to the previous year and a low labor productivity.

Milk Industrialization Mures ends the financial year with the losses 1.79% in turnover and a net turnover in rebound from the previous year by about 15%.

Finally, SC Trd. Tnuva Romania Dairies SRL, even though it managed to increase its turnover by nearly one percent over the previous year, has high losses, which exceed with about 6 percent the turnover and among the lowest labor productivity compared to the companies discussed (0.3059 million RON / employee).

Based on these elements we draw the following hierarchy of competitiveness, which summarizes the two rankings obtained based on ELECTRE method and the index of competitiveness method:

<table>
<thead>
<tr>
<th>No. crt</th>
<th>Company</th>
<th>The rank achieved by ELECTRE method</th>
<th>The rank achieved by Competitiveness index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S.C. Danone P.D.P.A. (E_1)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Whiteland Import – Export (E_2)</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
3 S.C. Albalact S.A. (E₃)       3 3
4 S.C. Napolact S.A. (E₄)       4-5 4
5 S.C. Delaco Distribution S.A. Brașov (E₅)       6 5
6 S.C. Dorna Lactate S.A. (E₆)       4-5 8
7 S.C. Hochland Romania (E₇)       7-8 6
8 S.C. Friesland Romania (E₈)       7-8 7
9 S.C. MilkIndustrializationMures (E₉)       9 9
10 S.C. Trd. Tnuva Romania Dairies S.R.L. (E₁₀)       10 10

References


The Impact of Information Systems on user Performance: An Exploratory Study

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Information systems play an important supportive role in most sectors of the economy. This study was developed to answer the question related to the impact of information systems on user performance in Tunisian companies. This article proposes a model combining the Task Technology Fit (TTF), the Technology Acceptance Model (TAM) and Delone & McLean model to evaluate the performance of users in the Tunisian organizations. The model was tested using survey data collected from 314 users of the information system. The results of structural equation analyzes supported the proposed model and highlighted the important role of perceived ease of use and perceived usefulness in mediating effects between TTF, system quality and information quality and performance users.

The results show that TTF, system quality and information quality directly influences the performance of users and indirectly through perceived usefulness and perceived ease of use.

Keywords: Information System, System quality, Information quality, User performance.

Introduction

Understanding the impact of information systems on the performance of users is very crucial for all organizations because it can improve performance either organizational or individual. However, the value of understanding the impact of information systems on user performance has not yet received adequate attention. Most previous researches have focused on identifying the determinants of computer acceptance, making it inadequate to determine the
impact of different types of information systems user performance[24- 25- 35-
34- 40].

Then, with increasing competitive pressures, managers are trying to
achieve maximum productivity of people, processes and information systems. This leads one to ask, how can managers configure information systems to
achieve higher levels of performance end users? In this regard, managers
continually seek advice on how to meet the promises and expectations of
continued increases in productivity through the use of information. However,
the results of research on how to achieve better performance through the use
of technology and information systems in organizations, has been mixed. Therefore, it has been difficult for researchers in information systems to provide
managers with advice on investment in specific aspects of information
systems that lead to the highest performance possible users [43].

In light of these facts and because organizations invest significant
resources in the adoption of IS, this research attempts to assess the impact
of IS systems on the performance perceived by the user in the Tunisian
organizations. In other words, in conducting this study, we must answer the
following question: What is the impact of IS on the performance perceived by
the user in the Tunisian organizations?

The rest of the paper is structured as follows. In the next section,
a theoretical framework will be developed. Followed by the framework, a
research model and hypotheses to be constructed in Section 3. Sections 4 and 5
describe the research methodology, the data analysis procedure and the results
of the tested model. Finally, in sections 6 and 7, the results of this research will
be discussed as well as the theoretical and managerial limitations and future
directions of research, followed by conclusions.

Literature Review

The impact of information systems on the performance of end users
and the relationship between information systems and performance and
productivity is of great interest to many researchers and research showed SI
[38]. A large number of researches have been associated with the performance
of end-user starting with Davis [19] with the model technology acceptance
(TAM).

Thus, DeLone and McLean [21] identified six factors for the success of
information systems, namely system quality, information quality, system use,
user satisfaction, individual impact and organizational impact. In addition,
Seddon [59] in his extension of the work of DeLone and McLean, resumed their factors and added others. Of course, researchers are a major challenge to find a conceptual and theoretical framework for interpreting the effects of information systems on user performance and productivity.

Despite huge investments in information systems in recent years, demonstrate the effects of information systems performance has proved extremely difficult [54-49-8-3].

This relationship is multifaceted and includes several aspects such as the user’s work, tasks and other aspects that will be discussed in what follows.

Igbaria and Tan [40] studied the relationship between information systems and users by investigating performance on several factors, including the use of the system, system quality, information quality and performance of the user. Data were collected from users in large organizations. They concluded that the above factors positively affect user performance, with results that suggest that user satisfaction is an important factor which affects the use of the system.

Similarly, Chan and al. [14] examined a number of important factors that affect the performance of users in incorporating many factors from different perspectives to determine their contribution to the improvement of user performance. In their model, the main factors considered are the data models, task characteristics and user characteristics. They concluded that these factors positively affect user performance. They also mentioned that other factors may have an impact on user performance than the rest. For example, the accuracy of the information was the most effective dimension of the quality of information affects the performance of users, as the users are concerned about the quality of information they get from a system which in turn affects the quality of their performance.

Recently, the impacts of information systems on individual performance were considered by Stone et al. [64] in their study. They presented a theoretical model linking information quality, system quality and the tasks performed on organizational performance with the ease of use of the system and the impact on individual performance. The results show that the measures of the quality of information and system quality affect the tasks performed by the user.

Some researchers have adopted a close and profound attention to investigate the effects of a specific system performance of the user, and to examine in detail the impact of the quality of the performance of the user. For example, Butler [13] stated that the response time of the system is very critical
for the performance user; the results show that the response time of the system positively affects user performance and other factors on the quality of system such as accuracy and reliability.

Researchers have attempted to control these factors more deeply to identify their impact on user performance more accurately. For example, Wierschem and Brodnax [69] identified the impact of improvements in the treatment of personal computers processors speeds on user productivity.

A controlled laboratory experiment was conducted to measure the impact of the speed of the processor on the output of the students. Based on the results of the experiment, it was found that the productivity of the end user, as measured by an increase in the volume of work is improved.

These studies have established very important conclusions on certain factors and their interactions that affect the performance of the user, such as the use of the system, system quality and reliability. In addition, they have improved the previous models and have developed more comprehensive models and conducted new empirical investigations on the impact of information systems on user performance.

Some previous research on the performance of users relied on dispositional factors such as attitudes and intention to use, to examine the impact of information systems and predict user performance [41], which leads to more conclusive debate and ambiguity. However, Sears and Jacko [58] studied the effects of situational factors on the performance of the user. They have established close links between the system, the task, satisfaction and performance. In the same vein, Hossain et al. [37] relied on the psychological traits of users in order to study the impact of information systems for clients on user performance. The results show the significant impact of traits on the relationship between information systems and performance users.

Research model and hypotheses

The proposed model was developed after a review of the results of studies on information systems, covering the most important factors in both information systems and user performance. Thus, this research is carried out in companies with one or more information systems, users are invited to assess the actual impact of information systems on user performance. This choice is supported by previous research [7-27-21-18].

Models TAM, TTF and D & M complement each other, which mean that their integration is useful for understanding the impact of information
systems [23]. Previous research has studied these models separately without links between them. However, theoretical and empirical reasons argue for the existence of links between these models [65]. Therefore, the research model proposed by extending TAM and TTF model with D & M provides a better explanation of the impact of information systems on user performance (Figure 1).

**Task Technology Fit (TTF):**

The Task Technology Fit (TTF) is one of the well-known models in IS used to study the relationship between a system, the task requirements and user needs. This model is based on the idea that when the characteristics of user tasks and characteristics of the information system integrate well together, both system use and user performance will be high [27]. Relationships between factors associated with TTF such as compatibility information (Compatibility), understanding the information (Meaning) and the ease of information retrieval (Locatability) reflect the consistency between the needs of users, or what is called the task requirements and the technology used to perform these tasks. Thus, the consistency of the characteristics of the system with the user requirements leads to better performance [27].

Empirically, the results show that TTF factors directly affect the performance [42]. In other words, the capacity of the system can affect the perceived usefulness in improving user interaction with the system. In this sense the system's ease of use, perceived usefulness and perceived ease of use

---

**Figure 1:** Operational research model
are linked together [60]. For example, a high quality system provides faster response to users, leading to improvements in the perceived usefulness and performance [46].

Finally, it is worth mentioning that the level of the relationship between all the factors mentioned above differs from SI environment to another, depending on the characteristics of the system and the user. However, in developing the study design, the factors were chosen deliberately systems. Overall, the factors were chosen with reference to a wide range of studies and their use in information systems and user performance. From this we posit that:

\[ H_1: \text{The TTF affects user performance directly and indirectly through perceived usefulness and ease of use in organizations.} \]

\[ H_{1a}: \text{The TTF directly affects user performance in organizations.} \]

\[ H_{1b}: \text{The TTF indirectly affects user performance in organizations through perceived usefulness.} \]

\[ H_{1c}: \text{The TTF indirectly affects user performance in organizations through the perceived ease of use.} \]

**Information Quality:**

The literature on information quality reflects the existence of a number of views on what constitutes the attributes of information. A large number of empirical studies have been conducted to develop a framework for measuring the quality of information [67- 39], from the many characteristics identified by Bailey and Pearson (1983) such as accuracy, precision, currency, timeliness, completeness, conciseness, format and relevance. Confirming the previous frame, Watson and Shneider [68] identified five characteristics of information quality are accuracy, timeliness, conciseness, convenience and relevance. In this sense, Huang and Wang [39] have conducted a series of studies on information quality and have used the accuracy, relevance and accessibility. Miller [51] used usefulness, accuracy, timeliness and relevancy to measure the information quality, while Alka [1] used the clarity, relevance, accuracy and timeliness of research users. Similarly, Bovee (2004), used the relevance, interpretability, accuracy and accessibility.

In conclusion, by analyzing these measures, it seems possible to formulate a basic measure for this study. The characteristics of quality information most commonly and widely accepted are identified and presented in Livari (2005), Bovee, (2004), DeLone and McLean (1992, 2003) and Wang and Strong (1996). This study therefore reinforces these features commonly
used to construct a measure of the quality of information that includes the relevance, accuracy, timeliness, completeness and accessibility. From this logic, and parallel with past studies, we hypothesize:

The quality of information affects the performance of users directly and indirectly through perceived usefulness and perceived ease of use in organizations.

The quality of information directly affects the performance of users in organizations.

The quality of information indirectly affects user performance in organizations through perceived usefulness.

The quality of information indirectly affects user performance in organizations through the perceived ease of use.

**System Quality:**

The measurement of the quality of information systems is a multidimensional process focusing on different aspects, because a system has many aspects such as system aspects, quality aspects and other aspects related to technical issues. In general, the measure of system quality concentrates on the specifications of a target system. However, some studies have examined the benefits and use of the system and its efficiency. Some studies have used the reliability, response time and ease of use as mentioned in various researches to support ERP users to perform several tasks at the same time and for different purposes [2].

Typical measures of the system quality in the traditional studies include system stability, availability, response time and ease of use [71]. In this context, it should be noted that researchers used different measures to investigate the system quality depending on the nature of the research and its objectives. Some studies have focused on the technical aspects of the system, while others focus on system performance and its ability to provide quality information. However, most studies have many similar measures. According to DeLone and McLean [22] quality system is measured by the perceived ease of use, reliability, functionality, flexibility, data quality, integration and portability, reflecting the users needs dependence on system quality. However, from a practical point of view, a high level of system quality can provide users convenience, more privacy and quicker responses. For example, Lederer et al. [46- 47] have shown that the capacity of the system have had a positive impact of perceived ease of use and perceived usefulness of the system.

Indeed, many researchers have generally focused on the performance
characteristics of a system to measure the system quality. These features were mostly drawn from the list of Hamilton and Chervany (1981) concerning measures of the quality system. The list is probably the best known in the literature in terms of the measure of the system quality [33-73-74].

The list includes response time or so-called the turnaround time, reliability, flexibility and ease of use. The researchers found that the list covers all relevant elements of the quality system. Seddon [59] measure the system quality by reliability, user interface, consistency, ease of use and quality, which is consistent with the list of Hamilton and Chervany [33]. Thus, in this research the system quality measures are reliability, response time, correctness and integration. Based on the theoretic and empirical support, we hypothesize that:

H3: The system quality affects user performance directly and indirectly through perceived usefulness and perceived ease of use in organizations.

H3a: The system quality directly affects the user performance in organizations.

H3b: The system quality indirectly affects user performance in organizations through perceived usefulness.

H3c: The system quality indirectly affects user performance in organizations through the perceived ease of use.

**Ease of use and perceived usefulness**

The perceived ease of use refers to the extent to which users believe that using a particular system would be easy to manage, manipulate and regroup [44-19-67]. The perceived ease of use shows the degree to which a system is considered as not being too difficult to understand, learn and use. The perceived ease of use was found to influence the behavior of users, either directly or indirectly, by the use of the system.

On the other hand, Perceived usefulness refers to whether the system provides accurate, timely, relevant, reliable and valid information for users or not [51]. Therefore, using the system will enhance job performance, productivity, efficiency and quality of work.

As noted by Bhattacherjee [11], the willingness of a person to interact with a particular system is already considered useful. Thus, it is expected that users will adopt a system if they believe that it will help them to achieve the desired results of performance [4].

In the literature, the perceived ease of use and perceived usefulness are interdependent and used together in most aspects of research that affect
each other in individual aspects [19]. Perceived usefulness is regarded as a term for the individual impacts such as improving individual productivity and performance [55- 59]. In addition, Wixom and Watson [70] found that the quality of information, system quality and perceived usefulness are related to each other, expressing that the higher is the level of quality of information and quality system, the higher the system is useful.

Measures for the perceived usefulness and perceived ease of use were adapted from previous studies using the model of technology acceptance [19-40- 52- 60- 66]. Therefore, we posit that:

- **H4:** The information qualities affect perceived usefulness and perceived ease of use of IS.
  - **H4a:** The information qualities affect the perceived usefulness of IS.
  - **H4b:** The information qualities affect the perceived ease of use of IS.

- **H5:** The system qualities affect the perceived usefulness and perceived ease of use of SI.
  - **H5a:** The system qualities affect the perceived usefulness of IS.
  - **H5b:** The system qualities affect the perceived ease of use of IS.

**User performance**

There are different points of view on user performance. It can simply be considered as the set of results achieved. On the individual level, it is the set of a person's realizations [61- 6- 9].

Measuring performance is normally achieved by aspects such as speed, time, accuracy, efficiency and effectiveness [26]. Nevertheless, when it comes to work-based software, it is important that systems are able to provide people with information so they can work and make decisions [62]. This success is measured in terms of speed and accuracy of obtaining the necessary information to users from a system to accomplish their [26].

Some researchers have indicated that the performance can be evaluated using two performance measures namely productivity and quality of work. According to Hodgkinson [36], performance is usually measured by quantitative and qualitative indicators, which generally fall into three main indicators of effectiveness, efficiency and quality in order to describe the relationship between the input and output of resources, thus, referring to the effectiveness and efficiency. Though, there is another indicator of performance measurement which is the ability of people to create new ideas related to their work or how they carry out the work.

Based on the work of Cohen [17], performance can be measured
through three criteria which are the quantity of outputs, quality of outputs and behavioral outcomes. Cohen also included efficiency measures of productivity, quality time response. In short, objective measures of performance are not available and in any case, would not have been compatible with all individuals having different jobs and tasks [27]. Therefore, for the purposes of this research, the performance of users will be measured by the effectiveness, efficiency and creativity by asking users their views about their perceived performance, because Most of the measures used in previous studies refer to these three measures.

Research Methodology

Empirical validation of the research model of the impact of IS on the performance of the users was conducted using a questionnaire administered to 400 users of IS in Tunisian companies. Of the 400 completed questionnaires, 86 were rejected because of outliers. The final sample size was thus established in 314 participants of whom 200 are women and 114 men. The age of respondents varied between 26 and 60 years with a concentration in class 30 to 39 years. The age of respondents varied between 2 and 25 years with a dominance in the class 4 to 6 years. The questionnaire distributed was formed from the scales we adapted.

Measurement scales were developed following the procedure of Churchill [16]. In the exploratory phase, we proceeded to the generation of a set of items based on adaptation of existing scales (Appendice 1).

The collected data were analyzed in two stages. Firstly, the exploratory and confirmatory factor analysis was conducted to assess the dimensionality, reliability and construct validity. Secondly, the methods in Amos structural equation 18 were used to test the relationships between variables in the model of ERP and performance users. These two steps and their results will be presented in what follows.

Analysis of results

Factorial analysis:

The exploratory analysis was conducted in SPSS 17. The dimensionality of the scales was assessed by a principal component analysis (PCA) with varimax rotation. Four items were eliminated Complet2, Resptime2, Effectiv5 and Efficien1. These are items whose contributions are shared between several
axes or those with low contributions factor [32]. Measurement instruments have good psychometric qualities. All items selected are generally good factorial contributions. Reliability and internal consistency of the items constituting a single dimension were evaluated based on Cronbach’s alpha. All variables in the model have good Cronbach’s alpha coefficients. Appendice 2 provides a tabulated summary of the main results of the exploratory analysis.

In a second phase, a confirmatory factorial analysis was performed in 18 Amos to test construct convergent and discriminant validities. At the conclusion of this step, the analysis of construct validity yield acceptable results. Table 1 summarizes the adjustment indices that can be considered good, given the complexity of the model and the size of the relatively small sample [56]. The first index (Chi-2/ddl) satisfies the threshold advocated 2 to 5. The RMSEA is less than the threshold limit of 0.08. CFI and TLI are above the critical threshold of 0.9. The GFI and AGFI are satisfactory insofar as their values are close to the recommended threshold of 0.9. These values may be due to the sensitivity of these indicators to the number of parameters to estimate and the sample size [32- 56]. The adjustment of the measurement model is therefore considered satisfactory (GFI = 0.887, AGFI = 0.841, CFI = 0.938, TLI = 0.925, RMSEA = 0.049 and RMR = 0.045).

**Presentation of the causal model and verification of assumptions regarding causal links:**

The causal model of our research provides a good adjustment. Indeed, absolute, incremental and parsimony indices shown in Table 1 satisfy the empirical conditions generally recommended in previous research.

<table>
<thead>
<tr>
<th>Indice</th>
<th>Chi-deux/ddl</th>
<th>GFI</th>
<th>AGFI</th>
<th>RMR</th>
<th>RMSEA</th>
<th>TLI</th>
<th>CFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>1,479</td>
<td>0.916</td>
<td>0.893</td>
<td>0.075</td>
<td>0.52</td>
<td>0.932</td>
<td>0.940</td>
</tr>
</tbody>
</table>

Figure 2 shows the causal model that integrates system quality, information quality, perceived usefulness, and perceived ease of use and user performance. This model explains the impact of information systems on the performance of users and provides information about intensity and significance of the relationships between variables.
At this level, the causality of this model allows the validation of all the assumptions of our research work. Indeed, Table (2) shows that all causal links are significant at the 5% level.

**Table 2: Significance of the causal links of the causal model**

<table>
<thead>
<tr>
<th>Causality</th>
<th>Student Test</th>
<th>P</th>
<th>Estimate</th>
<th>Hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a TTF → User performance</td>
<td>2,993</td>
<td>0,003*</td>
<td>0,236</td>
<td>Accepted</td>
</tr>
<tr>
<td>H2a Information Quality → User performance</td>
<td>3,465</td>
<td>0,000*</td>
<td>0,307</td>
<td>Accepted</td>
</tr>
<tr>
<td>H3a System Quality → User performance</td>
<td>2,781</td>
<td>0,005*</td>
<td>0,190</td>
<td>Accepted</td>
</tr>
<tr>
<td>H4a Information Quality → Perceived usefulness</td>
<td>5,113</td>
<td>0,000*</td>
<td>0,407</td>
<td>Accepted</td>
</tr>
<tr>
<td>H4b Information Quality → Perceived ease of use</td>
<td>4,800</td>
<td>0,000*</td>
<td>0,369</td>
<td>Accepted</td>
</tr>
<tr>
<td>H5a System Quality → Perceived usefulness</td>
<td>3,529</td>
<td>0,000*</td>
<td>0,221</td>
<td>Accepted</td>
</tr>
<tr>
<td>H5b System Quality → Perceived ease of use</td>
<td>3,741</td>
<td>0,000*</td>
<td>0,238</td>
<td>Accepted</td>
</tr>
</tbody>
</table>
The importance of the mediating effect at the causal model:

After testing the significance of direct causality between the relational variables of our causal model, it is relevant to present in this paragraph the indirect links and show the importance of mediating variables in our model.

Table (3) to determine the importance of indirect effects compared to direct effects and total effects. In addition, a more detailed complement of this table was done at the level of testing mediating variables in order to check the significance of indirect effects and total effects.

<table>
<thead>
<tr>
<th>Structural links</th>
<th>Direct effects</th>
<th>Indirect effects</th>
<th>Total effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTF → User performance</td>
<td>0.236</td>
<td>0.144</td>
<td>0.380</td>
</tr>
<tr>
<td>TTF → Perceived usefulness</td>
<td>0.277</td>
<td>0.000</td>
<td>0.277</td>
</tr>
<tr>
<td>TTF → Perceived ease of use</td>
<td>0.357</td>
<td>0.000</td>
<td>0.357</td>
</tr>
<tr>
<td>System Quality → User performance</td>
<td>0.190</td>
<td>0.105</td>
<td>0.295</td>
</tr>
<tr>
<td>System Quality → Perceived usefulness</td>
<td>0.221</td>
<td>0.000</td>
<td>0.221</td>
</tr>
<tr>
<td>System Quality → Perceived ease of use</td>
<td>0.238</td>
<td>0.000</td>
<td>0.238</td>
</tr>
<tr>
<td>Information Quality → User performance</td>
<td>0.307</td>
<td>0.179</td>
<td>0.486</td>
</tr>
<tr>
<td>Information Quality → Perceived usefulness</td>
<td>0.407</td>
<td>0.000</td>
<td>0.407</td>
</tr>
<tr>
<td>Information Quality → Perceived ease of use</td>
<td>0.369</td>
<td>0.000</td>
<td>0.369</td>
</tr>
<tr>
<td>Perceived usefulness → User performance</td>
<td>0.246</td>
<td>0.000</td>
<td>0.246</td>
</tr>
<tr>
<td>Perceived ease of use → User performance</td>
<td>0.213</td>
<td>0.000</td>
<td>0.213</td>
</tr>
</tbody>
</table>

* : P < 0,05 (Significant).

It remains to verify the significance of these indirect effects, thing that AMOS software does not carry out, hence the use of the Sobel test. Sobel test is used to verify the presence of a mediation effect; it can determine whether the indirect effect of the independent variable divided by the dependent variable
through the mediator is significantly different from zero [56].

**Table 4: Sobel test for indirect links of the causal model**

<table>
<thead>
<tr>
<th></th>
<th>TTF/User Performance</th>
<th>Information Quality/ User Performance</th>
<th>System Quality/ User performance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Indirect effect</td>
<td>Z-Score</td>
<td>P</td>
</tr>
<tr>
<td>H1b Mediating Variable: perceived usefulness</td>
<td>0.0875</td>
<td>2.7233</td>
<td>0.0065*</td>
</tr>
<tr>
<td>H1c Mediating Variable: Perceived ease of use</td>
<td>0.0970</td>
<td>2.5340</td>
<td>0.0113*</td>
</tr>
<tr>
<td>H2b Mediating Variable: perceived usefulness</td>
<td>0.1667</td>
<td>2.9402</td>
<td>0.0033*</td>
</tr>
<tr>
<td>H2c Mediating Variable: Perceived ease of use</td>
<td>0.1304</td>
<td>2.5011</td>
<td>0.0124*</td>
</tr>
<tr>
<td>H3b Mediating Variable: perceived usefulness</td>
<td>0.0646</td>
<td>2.5172</td>
<td>0.0118*</td>
</tr>
<tr>
<td>H3c Mediating Variable: Perceived ease of use</td>
<td>0.0602</td>
<td>2.3000</td>
<td>0.0214*</td>
</tr>
</tbody>
</table>

* P < 0.05 (Significant)

The indirect effect of the FTT, system quality and information quality divided by the performance of users through perceived usefulness and perceived ease of use is positive and significant. This result shows the mediating role of perceived usefulness and perceived ease of use.

**Discussion of results**

**TTF and performance users:**

The results indicated that the TTF affect significantly and positively user performance. Goodhue and Thompson [27] suggested that the FTT had a significant and positive effect on the performance of the user. Consistent with
previous research on this relationship [63-15, this study also confirmed this relationship in two different ways, including the direct effect of the FTT on user performance and the indirect effect through the perceived ease of use and perceived usefulness. The results of this study confirm what was proposed in the original model and in previous studies in terms of impacts TTF. Therefore, the TTF is an important factor in the current research model, as in the original model.

Goodhue et al. [28] found that when a system has the features needed to accomplish a task, better performance is achieved. In addition, if a system is designed, which will lead to more users, which should produce a greater impact on user performance [63]. In addition, the study confirmed that TTF is also a robust model in which the task characteristics and technology determine the correspondence between the functional requirements of IS, and task demands [72].

Other factors such as perceived ease of use and perceived usefulness also contribute to the relationship between TTF and performance of the user. In addition, the study revealed that TTF affects user performance more significantly thanks to the perceived ease of use than perceived usefulness.

To enable users to obtain benefits from IS, the system itself must be seen as useful and fit properly to user tasks [27]. More specifically, the study shows that users who perceive the system as useful and fits well with its work requirements, perceive more positive and significant effect on their performance.

However, compatibility and adequacy of the systems were more important for the performance of the users while computer support was less effective in influencing the performance of the user [23-28-42]. This confirms the importance of compatibility and adequacy of user tasks. They reach more benefits when the systems have high compatibility and a better match with their job requirements.

**System quality and performance users:**

The results of the study indicate that the quality of the system affects the performance of users, both directly and indirectly, which shows a strong direct correlation between measures of system quality and user performance. The study confirmed the main proposal of DeLone and McLean [21] in the same way as in the original model. In addition, in order to identify the most important measures of the system quality which contribute to user
performance, a regression was made between the dimensions of the quality and performance of the system users.

The results show that the integration and reliability are the most important measures which contribute significantly to user performance and explain much of the variance in user performance.

Another important point is confirmed in this regard, is that the IS are designed for all levels of users and the results showed that IS are suitable for any type of user. This improves the user’s ability to rely on these systems to carry out their tasks in different functional areas. This increases the usefulness of IS and confirms the integration as an inevitable result and a strategic factor that improves the performance of users in organisations. This is consistent with previous studies [29- 30- 31- 53].

Regarding the indirect impact of system quality on user performance thanks to perceived usefulness and ease of use as mediators, the results showed that these mediators affect the user performance. The results show that when IS are perceived as high quality systems by users, they are more likely to be perceived as more useful, leading subsequently to positive effects on the user performance. Similarly, the findings show that when IS are perceived as high quality systems for users, they are more likely to be perceived as easy to use [58].

**Information quality and user performance:**

Consistent with previous studies in different types of information systems, the results of the study indicate that the impact of information quality on user performance is positive and significant. This study showed the importance of the information quality as a key factor positively influencing user performance. These confirm the findings of previous studies [5- 10- 22].

All measures of the information quality were analysed to determine the importance of each measure and determine who has the most significant contribution in predicting the user performance. Among these measures, the timeliness and completeness were considered the most important attributes of information quality to assist users in performing their tasks when using IS.

IS users give great attention to the completeness of the information as it contributes significantly to their performance. They reported that the completeness of the information available through the IS helps them achieve their performance goals and improve the quality of work performed. The accuracy and relevance are very important to the users performance, and help in conjunction with the comprehensiveness to improve user performance. It leads to a more precise work with fewer errors, and users rely on systems to
obtain the accurate information needed to perform their tasks and achieve their business goals. Finally, the availability of information also allows users to improve their efficiency and reduce the time spent in carrying out their tasks. The results indicate that perceived usefulness mediates the relationship between information quality and user performance. When SI provides high quality information, they are perceived as the most useful systems by users. This leads to impacts on the system performance more.

Similarly, the results show that the perceived ease of use is a key mediator between information quality and user performance relationship. The results show that the more users perceived IS ease of use the more they will have positive effects on user performance. The impact of information quality by perceived usefulness was slightly stronger than through the perceived ease of use. This implies that the information retrieved from the IS could be useful for the performance of users regardless of the perceived ease of use.

**Theoretical and managerial implications:**

This study provides further evidence of the appropriateness of extending the models of TTF, TAM and Delone & McLean as a useful means to provide an overview on the most important aspects of the IS impact on user performance. Therefore, the main theoretical contribution of this study to the theory of IS is the consolidation of three different models and the interrelationships between them to explain the impact of IS on user performance. In addition, the study goes further and provides an in-depth overview of the main measures of the factors studied. Previous studies have not provided an explanation of the dimensions of these factors and their importance in terms of impact and utility systems. First, the compatibility and adequacy as a measure of the FTT. Secondly, integration and reliability as a measure of the quality system. Finally, the timeliness and completeness as measurement of information quality.

This research shows the importance of TTF explaining the impact of IS on user performance. Previous research on TTF, concentrated mainly on computing, focused on factors such as user satisfaction and the attention of users to use an information system [45]. The results of this study suggest the extension to other factors such as the information quality and the system quality is important to determine the impact on the performance and use of information systems.

Overall, the above results can be useful for the implementation and management of IS. Thus, the suitability and compatibility of IS users’ needs
and job requirements play an important role in improving performance. The information systems managers, suppliers and consultants must pay sufficient attention not only to improve the quality of IS as a product, but also to improve the quality of systems outcomes, quality of information and ability to align with user needs [71].

Conclusions

The impact of information systems on user performance and the relationship between information systems and user performance are the theoretical foundations of this study. The use of the TTF, the TAM and Delone and McLean model [21-22] to predict and explain the impact of IS on the users performance, helped identify key factors influencing the implementation of IS. The empirical validation of the IS impact model on user performance in a sample of 314 Tunisian users showed that the effects of implementation of the IS depends on the degree of user acceptance. The results of the study confirmed the results of previous studies [19] showing that user performance is more better that they perceive the system more useful and easier to use.

Previous studies that have examined the impact of IS on users indicated that system quality and information quality are very important factors that affect the benefits of use [22- 50]. This study demonstrated the importance of all the factors mentioned above and explored the relative contribution of each factor to the user performance.

The results showed that users think that the IS ability is to provide high quality information, which reduces errors and resolve performance problems when they occur. In addition, the TTF and the system quality play an important role in improving the performance quality and increase the volume of users work. The results showed a satisfactory level of adjustment between IS and users needs and task requirements, taking into account the characteristics of IS.

Furthermore, perceived usefulness and perceived ease of use have proven to be very important factors that affect the use of the system and mitigate the impact on user performance. This is an opportunity for researchers and practitioners in IS to maximize IS impacts by improving training and organizational support in order to help users understand the benefits of using IS and improving adaptability of these systems with user needs.

Careful consideration of user needs and requirements of working in a particular industry will help designers and practitioners of IS design and
implement IS in the light of the diversity of suppliers, designers, functionality of IS and industries [72].

In spite of insights provided by the results of this research and managerial implications arising, some limitations should be noted. Some measurement scales of variables could be improved, including scales measuring perceived usefulness and perceived ease of use. Another limitation is inherent in the non-consideration of the characteristics of users to measure users’ performance based on sex, age, and experience.

In addition, most areas of research require further developments. Studying the impact of user characteristics on individual performance seems interesting.

References

through the use of human computer interaction”, 2003, Paper presented at the Proceeding of SAICSIT, SAICSIT.


Appendix 1. List of items selected for measurement scales

<table>
<thead>
<tr>
<th>Task Technology Fit</th>
<th>Compatibility</th>
<th>IS applications you use are suitable for your needs and help you to accomplish your tasks.</th>
<th>Compati1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Applications that you IS I uses are compatible with your tasks.</td>
<td>Compati2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IS applications are matched with the aspects of your work.</td>
<td>Compati3</td>
</tr>
<tr>
<td></td>
<td>Meaning</td>
<td>Understanding of the information obtained from the company’s IS on your task is easy to find.</td>
<td>Mean1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The exact meaning of the information is obvious and clear on the company's IS.</td>
<td>Mean2</td>
</tr>
<tr>
<td></td>
<td>Adequacy</td>
<td>The IS of the company meets your requirements of the task.</td>
<td>Adequa1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The IS of the company is sufficient to handle your processing needs of your work.</td>
<td>Adequa2</td>
</tr>
<tr>
<td>IT Support</td>
<td></td>
<td>You receive computer training you need.</td>
<td>ITSup1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>People with whom you are using IT include your work objectives.</td>
<td>ITSup2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>It is easy to get computer support and advice from other users when you are using the company’s IS applications.</td>
<td>ITSup3</td>
</tr>
<tr>
<td>Source</td>
<td></td>
<td>Goodhue and Thompson, 1998; Kositanurit and al., 2006; Lin and Huang, 2008; Klaus and al., 2003; Abugabah and al., 2009; Kositanurit and al., 2011.</td>
<td></td>
</tr>
<tr>
<td>Information quality</td>
<td>Accuracy</td>
<td>Your IS provides you with accurate information.</td>
<td>Accur</td>
</tr>
<tr>
<td>Quality Dimension</td>
<td>Description</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reliability</td>
<td>Your IS provides you with relevant information.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timeliness</td>
<td>Your IS provides you with the necessary information in a timely manner.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The information contained in your IS is timely and regularly updated.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Information from your IS time improves the quality of my work.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completeness</td>
<td>You can find complete information if necessary in your IS.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The information contained in your IS are sufficient to do your job.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accessibility</td>
<td>The information contained in your IS are easily accessible.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The information in your IS are easily retrievable.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The convenience of the information in your IS saves time in your work.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Wixom and Todd, 2005; DeLone and McLean, 2003; Abugabah and al., 2009; McGill and al., 2003

<table>
<thead>
<tr>
<th>Quality Dimension</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Quality</td>
<td>Your IS is reliable</td>
</tr>
<tr>
<td></td>
<td>Your IS provides consistent information.</td>
</tr>
<tr>
<td>Correctness</td>
<td>You find easier to correct your errors in your work with your IS.</td>
</tr>
<tr>
<td></td>
<td>Your IS helps you to reduce errors in your work.</td>
</tr>
<tr>
<td>Response Time</td>
<td>Your IS reacts and responds quickly when you entered data.</td>
</tr>
<tr>
<td></td>
<td>IS reacts and responds quickly to your questions.</td>
</tr>
<tr>
<td>Integration</td>
<td>IS provides integration with other systems.</td>
</tr>
<tr>
<td></td>
<td>Your IS effectively combines data from different areas of the business.</td>
</tr>
<tr>
<td></td>
<td>Your IS is designed for all levels of users.</td>
</tr>
</tbody>
</table>

**Source:** Wixom and Todd, 2005; Abugabah and al., 2009; DeLone and McLean, 2003; McGill and al., 2003

<table>
<thead>
<tr>
<th>Quality Dimension</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Usefulness</td>
<td>The use of IS is useful for the performance of your work.</td>
</tr>
<tr>
<td></td>
<td>I can not do your job without IS.</td>
</tr>
<tr>
<td></td>
<td>Your IS supports you in achieving the overall objectives of performance.</td>
</tr>
<tr>
<td></td>
<td>With your IS, it is easier to do your job</td>
</tr>
</tbody>
</table>

**Source:**
### Source
Davis, 1989; Ahn and al., 2007; Amoako-Gyampah, 2007 ; King and He, 2006.

### Perceived ease of use

<table>
<thead>
<tr>
<th>Items</th>
<th>Perceas1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your IS is user friendly.</td>
<td></td>
</tr>
<tr>
<td>It is easy to learn to use your IS.</td>
<td></td>
</tr>
<tr>
<td>You find your IS easy to use.</td>
<td></td>
</tr>
</tbody>
</table>

### User performance

<table>
<thead>
<tr>
<th>Effectiveness</th>
<th>Effectiv1</th>
</tr>
</thead>
<tbody>
<tr>
<td>IS has a positive impact on your productivity</td>
<td></td>
</tr>
<tr>
<td>IS to reduce the time needed to accomplish your tasks</td>
<td></td>
</tr>
<tr>
<td>IS multiplies case you realize your work.</td>
<td></td>
</tr>
<tr>
<td>Thanks to your IS in your work you can accomplish tasks faster</td>
<td></td>
</tr>
<tr>
<td>Your IS allows you to do more work than before.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Efficiency</th>
<th>Efficien1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your IS improves the quality of your performance</td>
<td></td>
</tr>
<tr>
<td>Your IS helps you to solve your employment problems</td>
<td></td>
</tr>
<tr>
<td>Your IS reduces errors in your work performance</td>
<td></td>
</tr>
<tr>
<td>Your IS improves your efficiency in your work.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Creativity</th>
<th>Creativ1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your IS improves user creativity</td>
<td></td>
</tr>
<tr>
<td>Your IS helps you to create new ideas in your work</td>
<td></td>
</tr>
<tr>
<td>Overall, the IS can achieve your employment goals.</td>
<td></td>
</tr>
</tbody>
</table>

### Variables

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Items</th>
<th>Exploratory factor analysis</th>
<th>Confirmatory analysis</th>
<th>Joreskog rho</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cronbach’s alpha</td>
<td>Factor Contributions</td>
<td>Factor Contributions</td>
<td></td>
</tr>
<tr>
<td>TTF</td>
<td>Compatibility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compat1</td>
<td>0,784</td>
<td>0,848</td>
<td>0,789</td>
<td>0,815</td>
</tr>
<tr>
<td>Compat2</td>
<td>0,718</td>
<td>0,674</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compat3</td>
<td>0,829</td>
<td>0,769</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adequacy</td>
<td>Mean1</td>
<td>0,848</td>
<td>Mean2</td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------</td>
<td>----------------</td>
<td>--------</td>
<td>----------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mean2</td>
<td>0,801</td>
<td></td>
</tr>
<tr>
<td>IT Support</td>
<td>ITSup1</td>
<td>0,886</td>
<td>0,816</td>
<td></td>
</tr>
<tr>
<td>Information quality</td>
<td>Integr1</td>
<td>0,723</td>
<td>0,715</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reliability</td>
<td>Reliab1</td>
<td>0,755</td>
<td>0,661</td>
<td></td>
</tr>
<tr>
<td>Correctness</td>
<td>Correct1</td>
<td>0,696</td>
<td>0,728</td>
<td></td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>Percuse1</td>
<td>0,948</td>
<td>0,882</td>
<td></td>
</tr>
<tr>
<td>Perceived ease of use</td>
<td>Perceas1</td>
<td>0,904</td>
<td>0,839</td>
<td></td>
</tr>
<tr>
<td>Users performance</td>
<td>Effectiv1</td>
<td>0,800</td>
<td>0,685</td>
<td></td>
</tr>
<tr>
<td>Efficiency</td>
<td>Efficien1</td>
<td>-</td>
<td>0,471</td>
<td></td>
</tr>
<tr>
<td>Creativity</td>
<td>Creativ1</td>
<td>0,851</td>
<td>0,785</td>
<td></td>
</tr>
</tbody>
</table>

|                         | Adequa1 | 0,848  | 0,745  | Adequa2 | 0,745  |
|                         | Mean2   | 0,801  | 0,745  | Mean1   | 0,848  |
|                         | Adequa1 | 0,848  | 0,745  | Adequa2 | 0,745  |

|                         | ITSup1  | 0,886  | 0,83   | ITSup2  | 0,885  |
|                         | ITSup3  | 0,885  |        |         |        |
|                         | Integr1 | 0,723  | 0,776  | Integr2 | 0,611  |
|                         | Integr3 | 0,726  |        |         |        |

|                         | Reliab1 | 0,754  |        | Reliab2 | 0,637  |
|                         | Resptim1| 0,624  |        | Resptim2| Eliminated|
|                         | Correct1| 0,697  |        | Correct2| 0,779  |

|                         | Percuse1| 0,950  |        | Percuse2| 0,832  |
|                         | Percuse3| 0,915  |        | Percuse4| 0,935  |

|                         | Perceas1| 0,905  |        | Perceas2| 0,857  |
|                         | Perceas3| 0,933  |        |         |        |

|                         | Effectiv1| 0,807  |        | Effectiv2| 0,524  |
|                         | Effectiv3| 0,787  |        | Effectiv4| 0,610  |

|                         | Effectiv5| Eliminated |        | Efficien1| Eliminated |
|                         | Efficien2| 0,776  |        | Efficien3| 0,793  |
|                         | Efficien4| 0,601  |        |         |        |

|                         | Creativ1| 0,855  |        | Creativ2| 0,768  |
|                         | Creativ3| 0,790  |        |         |        |
A Suitable ‘GPS’ for SME’s: the Strategic Planning and Organizational Learning Nexus.

Author: Fabiola Baltar, University of Mar del Plata, Argentina, fabaltar@mdp.edu.ar

The aim of the article is to examine the relationship between organizational learning and strategic planning actions in SMEs. The hypothesis is that those firms that think strategic planning as an organizational learning process may encourage the design of ‘long-term objectives’, keeping SMEs flexible and adaptive. Thus, it allows the exploitation of opportunities and the accumulation of specific and competitive internal resources. A structural equation model is proposed, based on 147 argentinean SMEs surveys. The main conclusion is that firms involving in strategic planning are more likely to improve knowledge management and increase competitive resources and capabilities.

Introduction

It is well known the importance of small and medium sized enterprises (SMEs) for the contribution to employment, innovation and economic development (Sing et al. 2008). That is why authors have studied several topics related to SMEs’s resources, owner’s decisions and strategies implemented to survive and develop (Rivard et al. 2006; Vargas and Rangel, 2007). However, there is a negligible contribution on the relationship among strategic planning, decision-making behaviour and organizational learning. In fact, many attributes recognised to SMEs (for example, flexibility, heterogeneity, owner’s personality, strategic orientation) are the result of a complex set of member’s interactions, objectives, motivations, environments, leadership styles and entrepreneur’s attributes, all linked by decisions, information support and ‘learning by doing’ actions.

Strategic planning refers to the setting of long-term organizational goals, the implementation of those plans to achieve them, and the allocation of resources required for realizing these goals (Stonehouse and Pemberton 2002;
O'Regan and Ghobadian 2004). Thus, strategic planning is about competitive advantage. SMEs that engage in strategic planning is more likely to achieve higher business performance (Carland and Carland 2003; Gibson and Casser, 2005). Despite this, several authors have concluded that, in SMEs, there is a tendency to no planning, short-term operational decisions, and owner’s intuition to solve problems (Chaston, 2009). In practice, decision-making in SMEs tends to be reactive rather than proactive, and plans are often ad hoc and intuitive rather than formally written (Brouters, Andriessen and Nicolaes 1998; Stonehouse and Pemberton 2002).

In the new economy context, characterized by dynamic and innovative markets and a great deal of information, it is necessary to examine these beliefs and make a contribution on understanding the importance of strategic planning actions on SMEs’s learning capabilities to improve their performance. Huysman et al. (1994:167) argue that traditional theories of strategic planning have based their explanations on a ‘set of clearly defined business strategies which take into account business trends and information technology trends’. This prescriptive explanation might be wrong in SMES, characterised by a low level of expertise to map out a long term business perspective. Considering strategic planning as an organizational learning process may encourage the design of ‘long-term objectives’, keeping SMEs flexible and adaptive. Thus, it would allow the exploitation of market’s opportunities and the accumulation of specific and competitive internal resources.

For this, the following research questions are formulated a) What is the relationship between strategic planning and organizational learning in SMES? b) What are the variables associated with strategic planning and organizational learning in SMES? and c) What is considered a suitable strategic planning for SMES? In order to answer the research questions, a survey to 147 argentinean SMEs was administrated. Dimensions related to SMEs strategic planning, information support systems and organizational learning have been measured. The exploratory hypothesis is that although the level of implementation on strategic planning is still low, there is a positively correlation between strategic planning actions and organizational learning in SMES. This relation increases the competitive advantages in the long term (Grover and Segars, 2005).

I believe that the findings of the research bring practical implications for enterprises that regularly make decisions related to internal organization and business strategies. Thus, this descriptive analysis can add further evidence of strategic decisions with SMEs in the context of globalization, information society and new technology developments. In fact, the study of the factors
associated with strategic planning and organizational learning can contribute to the explanations about strategic resources and capabilities advantages among SMEs, capturing the idiosyncratic aspects present in firms that differ significantly from large companies’ characteristics.

The paper is structured in three parts. First, we describe the conceptual framework that justifies the key dimensions integrated in the empirical analysis. Second, we present the methodology, the variables used and the analysis techniques. Third, we discuss the main results and, finally, we draw some conclusions and implications of the research.

Theoretical framework

Strategic Planning and Dynamic Capabilities Relationship in SMEs. In the context of SMEs, many authors argue that there is a strong positively relationship between strategic planning and business performance (Carland and Carland 2003; Gibson and Casser, 2005). However, less development has the study of the links between organizational learning and strategic planning (Huysman et al. 1994). Perhaps, this is because of the use of ‘several terms ambiguously and interchangeably in the literature relating to strategy, resulting in a failure to distinguish between the concepts of strategic management, strategic thinking, strategic learning and strategic planning’ (Stonehouse and Pemberton, 2002: 853). While strategic thinking is oriented to understand the vision of the organization’s leaders about the strategic intent of the business, the strategic learning focuses in the way in which organization's members gather information to support strategies and respond to changes in its internal and external contexts correcting differences between the results achieved and the desired ones (Lima and Filion, 2011). Additionally, strategic planning is defined as the formulation of organizational plans based on flexible and broad objectives intending to manage the firm to its competitive position in the future.

Strategic planning helps managers in gathering information about the critical aspect of their business activities, predicting future scenarios and, finally, in taking decisions (Gibson et al., 2010). The relation between information technology support (IT) and strategic planning focused on the effect of the decision-makers attributes and organizational characteristics on the adoption of IT (Caldeira and Ward, 2003; Dwivedi and Lal, 2007; Levy and Powell, 2003; Riemenschneider et al. 2003, Chuang et al., 2007). Thong (1999) identified four contextual elements that are related to IT adoption: 1) decision makers’ characteristics; 2) technological context; 3) organizational culture
and, 4) environmental characteristics.

The reasons why some SMEs get involved in strategic planning while others not, still are not well understood (O’Regan and Ghobadian, 2002). In this sense, the literature have focused on the barriers to strategic planning in SMEs, identifying variables such as the lack of time (Robinson and Pearce, 1984), the lack of expertise or unwillingness to share strategic plans with employees and external consultants (O’Reagan and Ghobadian, 2006). Additionally, other variables were considered by authors such as context perception (Shrader, et al. 1995; Yusuf and Saffu, 2005), firm’s size (Stonehouse and Pemberton 2002), economic sector (Shrader, Mulford and Blackburn 1989) and internal implementation barriers (O’ Regan and Ghobadian, 2004). According with the resources and capabilities theory, strategic planning and is related to internal dynamic capabilities (Jung, 2006). Thus, it gives relevance to organizational learning, as a strategic priority in the SMEs’s decision-making process because of its influence on strategic planning development and the achievement of firm’s goals.

**H1:** SMEs’s strategic planning is related to the information technologies support, the proactive behaviour of the owners and formal employee’s participation in business decisions.

Although information is an essential aspect in the new economy context, strategic planning is more than a database supply. Strategic planning and IT adoption are key elements for knowledge construction. As Shee and Lee (2004: 935) claim that ‘IT achieve as least two objectives: reduction of uncertainties of knowledge loss derived from variation in employee positions and reduction of dependence on specific personnel and knowledge creation, searching, and diffusion is improved by IT, which increases transmission and response speeds’. In addition, IT facilitates storage and sharing of organizational knowledge. Furthermore, since high IT utilization leads to a reduction of IT application costs, it tends to be a source of competitive advantage. Thus, gathering accurate information facilitates knowledge creation (socialization and integration of managerial routines improving innovation), knowledge flow (vertical and horizontal flows and the combination of new and old information) and knowledge sharing (dynamic capabilities achieved by the diffusion of skills, experiences and learning by doing) (She and Lee, 2004).

Moreover, organizational learning is defined as the process characterised ‘by encoding inferences from history into routines that guide behaviour’ (Huysman, 1994:168). Those routines refer to rules, procedures, conventions, strategies and technologies as well as intangible dimensions such
as beliefs, frameworks and culture, etc. (Nelson and Winter, 1982). As Lima and Filion (2011: 2) suggest that organizational learning process is a cyclic process where ‘member’s actions, perceptions and interpretations of the impacts of context changes provide feedback on the organization’s activity system. Positive feedback leads to continuation of the existing action logic, but can also cause the desire to correct ‘errors’ by adjusting actions governed by that logic’. For this, organizational learning occurs when those actions and perceptions can be reflected in shared maps of the organization available to members to guide their actions. In large companies, this issue is solved by implementing a set of tools and formal procedures that capture the main aspects of business internal, external and performance results (for example balance scoreboard). However, it is necessary to go deeply into this phenomenon in SMEs context.

**H2: A small firm can increase organizational learning when the owners take rational decisions, interact with independent advisors, document previous decisions, formulate formal routines and share knowledge with all members.**

It is widely accepted that there is a direct relationship between strategic planning and organizational learning. However, the causal relationship and its direction is unclear and, ultimately, is irrelevant. For instance, King (1999: 42) considered that human resources are the primary resource for strategic planning because ‘informational inputs to IS planning come from users, top management, and the IS planning staff. They are collected from top management and users through a series of interviews in the first phase of the planning process’. On the other hand, some authors have suggested that in order to achieve planning objectives and knowledge sharing is necessary to get involved in strategic planning (Lee and Bai, 2003; Pai and Lee, 2004; Sher and Lee, 2003). Jung (2006) sustains that an effective IT infrastructure and knowledge management can maximize the return on organizational knowledge through continuously creating, accumulating, and sharing information. Current capabilities and routines are conditioned by previous routines, resources, and capabilities. Therefore, the development of dynamic capabilities demands a path-dependent assumption, a double-loop learning practice, and routines to learn routines. These factors develop a solid foundation for incorporating knowledge management into the strategic approach of dynamic capabilities.

**H3: There is a positive correlation between strategic planning and organizational learning. When small firms increase the level of formalization of their routines, adopt information system support and take proactive decisions, they are more likely to improve organizational
learning and develop strategic resources and capabilities.

According with the literature a conceptual model analyzing the relationship between strategic planning and organizational learning is proposed and shown in Figure 1.

Conceptual Model of Strategic Planning and Organizational Learning Nexus

![Conceptual Model of Strategic Planning and Organizational Learning Nexus](image)

**Figure 1:** Conceptual Model of Strategic Planning and Organizational Learning Nexus
Source: Author’s own

Research Method

**Sample and Data Collection**

An administered questionnaire was applied to 147 SMEs in Mar del Plata city, Argentina. Mar del Plata is the fifth argentine city in terms of inhabitants, and it characterizes by a high diversification of economic activities (food and fishing, tourism and commerce, construction, textile and metallurgical industry make the main contribution to local added value) and a prominence of SMEs business. Although this is a convenience sample, it was considered the heterogeneity and its representativeness, including firms of different economic sectors, demographic attributes of the decision-maker (genre, education, age and property),and the firm’s size (employment). Four dimensions were considered in the questionnaire: 1) owner’s demographic characteristics; 2) characteristics of the decisions (time, type and source); 3) networks and strategies and 4) information technology support. Table 1 and 2 present the variable definitions used in the tested model.
Table 1: Indicators of Organizational Learning in SMEs

<table>
<thead>
<tr>
<th>LATENT VARIABLE</th>
<th>INDICATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Related to organizational structure</td>
<td></td>
</tr>
<tr>
<td>* Existence of a formalized structure</td>
<td>Has the firm a formalized structure of routines and roles? (dichotomous</td>
</tr>
<tr>
<td>(ORG-FORM)</td>
<td>variable)</td>
</tr>
<tr>
<td>* Yes (1)* No (0)</td>
<td></td>
</tr>
<tr>
<td>Related to the decision-maker</td>
<td></td>
</tr>
<tr>
<td>* Rationality in decision-making</td>
<td>What is the most important aspect for taking a decision? (dichotomous</td>
</tr>
<tr>
<td>(RATIONAL)</td>
<td>variable)</td>
</tr>
<tr>
<td>* Rational (experience + information)</td>
<td>(1)</td>
</tr>
<tr>
<td>* Intuition (creativity + intuition)</td>
<td>(0)</td>
</tr>
<tr>
<td>Related to organizational decision</td>
<td></td>
</tr>
<tr>
<td>learning</td>
<td>Have you register past decisions implemented in the firm? (dichotomous</td>
</tr>
<tr>
<td>(DECI-DOC)</td>
<td>variable)* Yes (1)* No (0)</td>
</tr>
<tr>
<td>Related to external advisor</td>
<td></td>
</tr>
<tr>
<td>participation in decisions</td>
<td>Do you ask for external advise to take decisions? (dichotomous variable)</td>
</tr>
<tr>
<td>(EXT-ADV)</td>
<td>(1)* Yes (1)* No (0)</td>
</tr>
</tbody>
</table>

Source: Author’s own

Table 2: Indicators of Strategic Planning Practices in SMEs

<table>
<thead>
<tr>
<th>LATENT VARIABLE</th>
<th>INDICATORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of information technology support (INF-SYS)</td>
<td>Do you use information technology systems for decision support? (dichotomous variable)* Yes (1)* No (0)</td>
</tr>
<tr>
<td>Use of prospective information (PROSPECT)</td>
<td>Do you elaborate prospective information for long term decisions? (dichotomous variable)* Yes (1)* No (0)</td>
</tr>
<tr>
<td>Use of instruments and firm´s indicators for decision support (TOOL-SUP)</td>
<td>Do you base your decisions on technical indicators and instrument support? (dichotomous variable)* Yes (1)* No (0)</td>
</tr>
<tr>
<td>Use of tasks reports (REPORTS)</td>
<td>Do you ask for reports of the results? (dichotomous variable)* Yes (1)* No (0)</td>
</tr>
</tbody>
</table>

Source: Author’s own

A structural equation modelling analysis (SEM) was applied to test the conceptual model. The software used is EQS 6.0. The path analysis technique was used to establish the structural relations between observed and latent...
variables. The structural model has two parts: the measurement model, which relates the latent dimensions with observable indicators (construct validity), and the structural model, which establishes the correlations between the latent dimensions (reliability) (Bentler 2006). The potential of this technique is not given by the significance of the estimators but the weight and direction of the association. Significant estimators represent how the empirical model corresponds to the theoretical model proposed (Shook et al. 2004).

**Results**

This section presents the main results of the research. Firstly, table 3 shows descriptivestatistics of the variables incorporated in the model and some characteristics of the sample. Moreover, as it is known that the role of the owner in the definition of the strategies and decisions are crucial, I compared the statistical differences ($X^2$ test) among groups according with the rational or intuitional based decisions among decision-makers.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Total sample (percent)</th>
<th>Rational decision-maker (percent)</th>
<th>Intuitive decision-maker (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample size</td>
<td>147</td>
<td>71</td>
<td>76</td>
</tr>
<tr>
<td>Entrepreneur attributes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>60.5</td>
<td>47.2</td>
<td>52.8</td>
</tr>
<tr>
<td>Female</td>
<td>39.5</td>
<td>50.0</td>
<td>50.0</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-35 years</td>
<td>26.5</td>
<td>43.6</td>
<td>56.4</td>
</tr>
<tr>
<td>35-55 years</td>
<td>51.0</td>
<td>52.0</td>
<td>48.0</td>
</tr>
<tr>
<td>More than 55 years</td>
<td>22.5</td>
<td>45.5</td>
<td>54.5</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary-Secondary</td>
<td>36.1</td>
<td>47.2</td>
<td>52.8</td>
</tr>
<tr>
<td>University (complete/incomplete)</td>
<td>63.9</td>
<td>48.9</td>
<td>51.2</td>
</tr>
<tr>
<td>SMEs characteristics</td>
<td></td>
<td></td>
<td></td>
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</table>
### Economic Sector**

<table>
<thead>
<tr>
<th>Sector</th>
<th>0-5 employees</th>
<th>5-25 employees</th>
<th>25-100 employees</th>
<th>More than 100 employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>13.5</td>
<td>70.0</td>
<td>30.0</td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>32.0</td>
<td>53.2</td>
<td>46.8</td>
<td></td>
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<tr>
<td>Commerce</td>
<td>28.6</td>
<td>33.3</td>
<td>66.7</td>
<td></td>
</tr>
<tr>
<td>Service</td>
<td>25.9</td>
<td>47.4</td>
<td>52.6</td>
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### Employment

<table>
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<th>Employment Size</th>
<th>0-5 employees</th>
<th>5-25 employees</th>
<th>25-100 employees</th>
<th>More than 100 employees</th>
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</thead>
<tbody>
<tr>
<td>0-5 employees</td>
<td>15.6</td>
<td>47.8</td>
<td>52.2</td>
<td></td>
</tr>
<tr>
<td>5-25 employees</td>
<td>38.8</td>
<td>43.9</td>
<td>56.1</td>
<td></td>
</tr>
<tr>
<td>25-100 employees</td>
<td>27.2</td>
<td>55.0</td>
<td>45.0</td>
<td></td>
</tr>
<tr>
<td>More than 100</td>
<td>18.1</td>
<td>48.1</td>
<td>51.9</td>
<td></td>
</tr>
</tbody>
</table>

### Formalization of routines**

<table>
<thead>
<tr>
<th>Formalization</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>46.3</td>
<td>53.7</td>
</tr>
</tbody>
</table>

### Strategies preferences (X priority 1)

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profits</td>
<td>44.9</td>
<td>54.5</td>
</tr>
<tr>
<td>Financial</td>
<td>6.8</td>
<td>60.0</td>
</tr>
<tr>
<td>Consumer Satisfaction</td>
<td>26.5</td>
<td>41.0</td>
</tr>
<tr>
<td>Technological advance</td>
<td>1.4</td>
<td>50.0</td>
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</table>

### Information support

<table>
<thead>
<tr>
<th>Information support</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information technology adoption***</td>
<td>69.4</td>
<td>30.60</td>
</tr>
</tbody>
</table>

### Prospective analysis*

<table>
<thead>
<tr>
<th>Prospective analysis</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>52.1</td>
<td>47.9</td>
</tr>
</tbody>
</table>

### Tools support for decisions

<table>
<thead>
<tr>
<th>Tools support for decisions</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30.1</td>
<td>69.9</td>
</tr>
</tbody>
</table>

### Reports of results

<table>
<thead>
<tr>
<th>Reports of results</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>71.4</td>
<td>28.6</td>
</tr>
</tbody>
</table>
Regarding to owner’s attributes, 60.5 percent are men between 35 to 45 years old (51.0 percent) and with a high level of education (63.9 percent). The distribution of the sample, according with the economic structure, is the following: a) 13.5 percent are primary activities (agriculture and fishing); b) 32.0 percent are manufacturing (food, textile, metallurgical, and chemical); c) 28.6 percent are trade firms (restaurants and textile sales) and d) 25.9 percent are service suppliers. In terms of size, 54.4 percent is less than 25 employees, 27.2 percent in the range of 25-100 employees and 18.1 percent have more than 100. Furthermore, 46.3 percent has formalised routines and structure. Also, those firms with higher level of formalisation have more employees and concentrate in industrial sectors. Finally, SMEs consider that profits (44.9 percent), customer satisfaction (26.5 percent) and financial balance (6.8 percent) are the priority strategic goal of the firm. The remaining percentage is related to ethical (6.7 percent), political (4.1 percent), personal (2.7 percent), technological innovation (1.4 percent) and ecology goals (0.6 percent). Both the owner’s attributes and the industry characteristics reveal the existence of heterogeneity in the sample.

Moreover, it is possible to recognise different decision-making styles, according with the level of rationality applied to solve problems and take decisions. In the sample, 48.2 percent argue that before taking a decision they look for information and use their experience in solving problems. The rest considers creativity and intuition to imagine new solutions are the heart of business decisions. The differences between rational or intuitional decision-makers affect SMEs knowledge management but are not related to owner’s attributes and employment. In this sense, the main statistical differences are in variables associated to the economic sector, level of organizational knowledge, technology and formalization. Moreover, SMEs guided by a rational decision-maker is more likely to establish formal routines, adopt information technology support, request for external advisory, use prospective information...
and formally register recent decisions.

**Model fit results**

Figure 2 represents a path diagram that allows us to determine the set of relationships among all variables related to the conceptual model.

![Path Diagram Proposed to Test the Conceptual Model](image)

**Figure 2: Path Diagram Proposed to Test the Conceptual Model**

It was calculated the robust parameters in order to correct non-normal distribution among variables. Regarding to X2, the value obtain was statistically significant (153.282, degrees of freedom 28, p 0.1725>0.05) but it is well recognized that this statistic is sensitive to sample size. For this, additionally, it was considered other structural diagnostics for evaluate the overall fit of the model that are not sensitive to sample size (Bentler and Bonett, 1980). The root mean squared error of approximation (RMSEA) is an estimate of the discrepancy between the original and reproduced covariance matrices in the population. It is suggested that a RMSEA of 0.05 represents a close fit and 0.08, reasonable fits. In the model, the RMSEA is 0.45. Complementary, the 0.958 incremental fit index (IFI), the 0.955 comparative fit index (CFI) and the 0.981 Mc Donald’s index were all above 0.90, which is the critical value that means a close fit of the propose theoretical model to the underlying data. This global model fit coefficients the reliability of the model, though the statistical significance of the coefficients (t-values) in both latent variables show the validation of the constructs. Table 4 shows the results of the correlations.
Table 4: Coefficients Analysis and Confirmed Hypothesis

<table>
<thead>
<tr>
<th>HYPOTHESIS</th>
<th>PATH</th>
<th>STANDARIZED COEFFICIENT</th>
<th>&gt;critical value 1.98</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: LATENT VARIABLE STRATEGIC PLANNING</td>
<td>Information system support</td>
<td>0.65</td>
<td>5.44</td>
<td>Confirmed</td>
</tr>
<tr>
<td></td>
<td>Prospective plans</td>
<td>0.50</td>
<td>4.68</td>
<td>Confirmed</td>
</tr>
<tr>
<td></td>
<td>Tools for decision support</td>
<td>0.48</td>
<td>4.34</td>
<td>Confirmed</td>
</tr>
<tr>
<td>H2: LATENT VARIABLE ORGANIZATION LEARNING</td>
<td>External advisory</td>
<td>0.40</td>
<td>3.00</td>
<td>Confirmed</td>
</tr>
<tr>
<td></td>
<td>Past decisions registry</td>
<td>0.37</td>
<td>3.23</td>
<td>Confirmed</td>
</tr>
<tr>
<td></td>
<td>Rationality</td>
<td>0.25</td>
<td>2.57</td>
<td>Confirmed</td>
</tr>
<tr>
<td>H3 CORRELATION</td>
<td>Strategic planning -organization learning nexus</td>
<td>1.07</td>
<td>4.07</td>
<td>Confirmed</td>
</tr>
</tbody>
</table>

Source: Authors’ own based on EQS results.

The results show that all the variables are positively and significantly correlated. That means that those SMEs involved in strategic planning exhibit higher levels of organizational learning. Strategic planning in SMEs is directly related with information technology adoption, technical support for decisions (for example investment criteria and market research indicators), a prospective vision and formal presentation of future actions and expected results. Moreover, organizational learning is positively associated with rational decisions and registration of past events, great deal of information sources (internal and external) and democratic participation of members reporting results and sharing personal experiences with others.

Conclusions

This article presents an empirical contribution of the relevance of strategic planning and organizational learning ‘nexus’ in SMEs. Following the resources and capabilities theory, a rich knowledge management and the development of an intelligent organization can promote sustainable
competitive advantages among firms. However, the main critics about strategic planning highlight that ‘plans’ in SMEs threaten some advantages as the flexibility and capability to adapt their behavior to changing contexts. In that sense, results of this research show that there is no difference in terms of strategy orientation, size, and owner’s profile between firms involved in strategic planning and firms that do not do it. For this, it is necessary to define strategic planning as a result of a ‘learning by doing’ process where every action, information, and decisions are shared with member and constitute an intangible asset that makes SMEs unique and competitive. In fact, strategic planning can be compared to a ‘GPS’ which orients business direction, not in a prescriptive form but as a helpful option to alert when the firm goes in a wrong way and informs how to return to the right one. In this sense, strategic planning can help managers to absorb and manage information ‘just in time’ and promote knowledge spillovers that influence in organization learning. The combination of information, expert opinions, skills, and experience is a valuable resource for seeking competitive advantages in SMEs. In fact, strategic planning is not only a proper GPS to predict results, anticipate contextual changes and reduce uncertainty costs. It is also a correct way to align organization goals towards the development of dynamic capabilities, which results in a better context for innovation, organizational performance and the achievement of sustainable competitive advantages in the long term.

Even though, these exploratory results confirm the intuitive notion about the goodness of strategic planning, they also reveal the main limitations associated with its implementation. Firstly, SMEs who recognizes the importance of doing strategic planning focuses more in adopting “information technologies support” than in improving the human resource capabilities (for example, low level of employee’s reports and previous decision documentation). In this sense, SMEs have to increase their efforts in order to improve human resource management. Consequently, they will be able to maximize the value of those technologies and take advantages of the tacit and idiosyncratic learning which will impact on strategic planning flexibility. For this, it could be interesting to examine the managerial perceptions, employee’s capabilities and the business conditions and set the barriers and opportunities to get involved in those business practices. This can improve the understanding of ‘efficient strategic planning’ and its business results. Secondly, it is necessary to revise the notion of strategic planning in SMEs. Plans can be revised, changed and rewritten. They are not inflexible practices that constraint business actions and manager’s decisions. New economy business context requires flexibility,
rapid adjustments to changes, and opportune decisions. Evaluating moments for changing directions, interpreting information, developing the attitude to question mental models and the alertness to exploit new opportunities need organizational learning. New empirical contributions are needed, linking organizational learning with the characteristics of the strategic planning, identifying the attributes associated with long term SMEs’ performance and facilitating a successful strategy positioning.

References

A Suitable ‘GPS’ for SMEs: the Strategic Planning and Organizational Learning Nexus.


Active Strategies, Randomness and Ability in Investment Fund’s Performance Evaluation:
a Behavioral Approach

Authors: Silvia Bou Ysàs, Universitat Autònoma de Barcelona UAB, Barcelona, Spain, silvia.bou@uab.es
Magda Cayón Costa, Universitat Autònoma de Barcelona UAB, Barcelona, Spain, magda.cayon@uab.es

This paper follows one main purpose: approaching classical models from a behavioral point of view. And two secondary objectives: First, providing behaviorally based tools to study efficiency in investment funds markets. Second, proposing a new methodological approach in order to disentangle randomness from ability in investment fund’s performance.

We reach two main theoretical proposals:
To set the fourth order moment of our Sharpe’s ratio differences based indicator as a market efficiency measure.
To take the statistical comparison of the probability distribution of the fund’s Net selectivity with a $N(0, \sigma_p)$ distribution, as an indicator of luck/skill in investment funds performance measurement.

In order to illustrate these proposals, we take a randomly chosen sample of investment funds investing in four sectors: energy, financial, industrial and technology. We analyze: First, the cross sectional level of activity/efficiency in the market. And second, whether the individual results of each fund are ability or randomness caused.

Keywords: Market Efficiency, Investment Funds Performance, Randomness versus Ability.

Jel Classification: G.01
Introduction

Efficiency in financial markets and portfolio performance are two specific topics that have been specially shaken by the recent financial crisis. The reason for this impact might be explained by the fact that either market efficiency theories or performance evaluation measures are based on the Efficient Markets Hypothesis and the CAPM model. Until now the gap between efficient market hypothesis (EMH) and real financial markets has been quite successfully justified by allowing a certain level of inefficiency in the market in change of liquidity, so the existence of a certain level of inefficiency is assumed as desirable in order to make financial markets work. The EMH approach has been criticised for its rigidity, and according to Lo (2004) markets should be studied from a more evolutionary point of view in which organisms (managers) might be optimizing a utility function whose main aim is not to maximize value but to survive.

In this paper we take a behavioural approach by observing how professional fund managers act. These managers know how everyday markets work and are used to these inefficiencies, and some of these professional managers undertake active strategies so we can infer that they believe they are able to beat the market. According to the EMH these managers do not have any reason to act such, but they do, and indeed sometimes they beat the market. Of course, this can be easily explained by EMH theorists as a coincidence of punctual inefficiency and a punctually lucky manager.

According to this explanation, we do not see managers that beat the market systematically in the long run, and if we consider a long enough period of time we should see that luck does not exist in the long run in a given market, so the quality of a manager cannot be persistent over time.

Classical theoretical models are grounded in the rational election paradigm so they don’t consider limited rationality or irrationality to explain the way markets work. In this sense we would like to approach these models from a behavioral point of view in order to be able to develop new tools that might: first, determine how efficient these markets are, and second, analyze investment funds performance according to the fact that it is, of course, influenced by the level of efficiency in the market, but mostly determined by the investment decisions undertaken by managers.

This paper follows two objectives. First, to set a proper theoretical background to analyze investment funds markets according to a behavioral point of view. Second, to provide a new methodological approach, in order to
disentangle luck from skill in investment fund’s performance.

These objectives are closely related to the two main issues that might be considered when evaluating investment funds performance. On one hand, the framework market in which we measure this performance, on the other hand, the specific behavior of individual managers.

Regarding the first point, we must assume that performance, according to its own definition, cannot be an absolute measure but it must be a relative one, so the benchmark that is used to set this performance might affect the validity of it. According to this, our proposal assumes that investment funds should be previously grouped according to the market they invest in, in order to be able to properly measure their performance.

This is the reason why setting an appropriate benchmark framework is so important in portfolio performance measurement.

It might seem a paradox that willing to study some behavioral aspects of investment funds markets we shall take a classical theory as the efficient market hypothesis and so the CAPM as theoretical background but, as it has been said, what we aim in this paper is not to set a new theory but to approach the current one from a behavioral point of view.

**Performance and market efficiency**

This paper is based on the CAPM theoretical framework and given that we are trying to evaluate investment funds performance, the proper risk measure to be taken under consideration is, $\sigma_p$, the standard deviation of the random variable $\tilde{R}_p$ which indicates the return of portfolio $p$.

A widely used performance measure according to these characteristics is the Sharpe ratio that indicates the slope of the Portfolio Possibility Line for each portfolio $p$.

By comparing portfolio's $p$ Sharpe's ratio with the slope of the CML we can determine how good the fund performed comparing with the market the fund is investing in.

As it can be seen in figure 1, portfolio $p$ is performing better than portfolio $k$. This fact can be measured by comparing the slopes of the two Portfolio Possibility Lines, which means comparing the Sharpe’s ratios of both portfolios.
The Sharpe ratio allows us to easily order performance from a given group of funds investing in the same market, but we don’t obtain any information about how efficiently these funds are performing or how active the management strategies they undertake are.

When we approach investment funds performance from a behavioral point of view the juxtaposition between active and passive strategies comes into play. It is a manager’s decision to undertake an active strategy so he might have the possibility to beat the market or to just follow the model and undertake a passive strategy in which case he would be on the Capital Market Line.

According to this, while wanting to measure active management, it is necessary to set a suitable passive portfolio in order to have a benchmark for comparison. Once this passive portfolio is set it will be possible to identify successful or unsuccessful active strategies.

The CAPM model assumes that the optimal passive strategy for an investor consists in combining the free risk asset with the market portfolio, so a suitable passive strategy for a given group of funds would be a combination of bonds and the reference market index. This is equivalent to any position on the CML.

By calculating the Sharpe ratio from this portfolio, we obtain a passive benchmark for each fund group that will allow us to later develop a measure that might determine the level of efficiency and activity for each market.
Once the group passive benchmark is set it is possible to measure the dispersion around this benchmark. This dispersion measure provides the first approach to measuring the level of activity, meaning that the more dispersion that is observed, the more active strategies are being undertaken by managers. So we define Group Dispersion Indicator as follows:

\[
gE_g = \frac{\sum_{j=1}^{N} (S_p - S_{pp})^4}{(N)GD_g^4}
\]

Where \(S_p\) is the Sharpe ratio of a portfolio of a given group of funds, \(S_{pp}\) is the Sharpe ratio of the passive portfolio and \(N\) is the number of funds in the group.

In a deeper analysis, the fourth order moment appears as a better method to measure the level of activity in a certain group of funds. Given that in a fully efficient market, the best strategy a manager can set is a passive strategy, we must assume that a certain level of inefficiency incentivizes fund managers to undertake active management in order to beat the market. In highly efficient markets with highly passive strategies we are supposed to find a “peaky” shape in the Sharpe ratio distribution of probabilities. This would be coherent with the lack of opportunities to beat the market; in consequence all managers in the market are incentivized to undertake passive strategies. Nonetheless a flat distribution could be associated with a more inefficient market where managers may have the opportunity to beat the passive benchmark by implementing higher activity strategies.

These arguments lead us to suggest as an active strategies measure the following fourth order moment indicator as Group Efficiency Indicator:

\[
gE_g = \frac{\sum_{j=1}^{N} (S_p - S_{pp})^4}{(N)GD_g^4}
\]

We must observe that this indicator will have a higher value while managers in a given market are closer to the passive strategy which might be related to the lack of incentives to beat the market due to a high level of market efficiency. Further, we should find a lower value of this indicator when the number of managers that are undertaking active strategies is higher as a consequence of increased opportunities to outperform the market associated with a less efficient market.

Figure 2 shows how this fourth order moment might indicate efficiency in a given market according to the probability distribution of the Sharpe Ratios.
differences.

![图2: 效率指标和投资组合策略活动](image)

**Figure 2:** Efficiency indicator and portfolio strategies activity

According to the previous reasoning, in a less than perfectly efficient market, managers are more willing to set active strategies, but according to our theoretical background this inefficiency might not necessarily imply an increase in performance. In fact, in a highly efficient market, managers who dare to undertake an active strategy should have a worse performance than the passive strategy portfolio, so in an extreme case of perfect efficiency there would not be any observation above $S_{pp}$. We could then detect group management performance by measuring the distribution's skewness from the.

Having a positive skewness would mean that managers, by mean, are performing positively so they beat the market. On the contrary, negative skewness is an indicator of less than average management performance.

We propose a management performance measure for a certain group of funds, based on a third order moment, the following Group Management success indicator:

$$GMS_g = \frac{\sum_{p=1}^{n} (S_p - S_{pp})^3}{(N)GD_g^3}$$

This indicator will have positive sign if managers, in the same framework market, surpass, on average, the output of the passive strategy and would be negative if they are underperforming it.

In figure 3 we can observe a Sharpe’s differences positively skewed distribution (green), meaning that managers in that market outperform the passive strategy and a negatively skewed distribution (red) that might indicate
that managers in that given market are not able to beat the passive strategy.

![Figure 3: Success and skewness](image)

**About luck and skill**

The second objective of this paper is to break down performance into luck and skill for individual funds. Therefore, we propose a performance measure that would allow us to order asset funds controlling for the market in which they invest. A manager will be considered a good performer if he succeeds at outperforming the market, so we propose as a measure of performance the indicator that Fama (1972) named Net Selectivity. The Net Selectivity measures the difference between the return effectively achieved by a fund and the theoretical profitability that would have been obtained according to the CML by undertaking the same level of risk.

\[
NS_p = R'_p - \left[ i + \frac{R_{pp} - i}{\sigma_{pp}} \sigma_p \right]
\]

Where \( R'_p \) is the return from the portfolio \( p \), \( i \) is the free risk asset rate, \( R_{pp} \) is the return of the passive portfolio, \( Q_{pp} \) is the standard deviation of the passive portfolio's return and \( \sigma_p \) is the standard deviation of the portfolio \( p \)'s return.

In figure 4 we show the net selectivity's graphical representation of portfolios \( p \) and \( k \), as it can be seen the net selectivity measures the distance
between the effective return of each portfolio and the return that could have been achieved, assuming the same level of risk, investing on the CML which means undertaking a passive strategy. Portfolio $p$ is outperforming the passive strategy so $NS_p$ has a positive value that indicates a good performance, on the other hand, portfolio $k$ is underperforming the CML so its net selectivity $NS_k$ has a negative value indicating a poor performance.

![Figure 4: Net selectivity](image)

It is interesting to observe that the group indicators previously defined are based on the same idea of excess return on the passive strategy, in fact GMSg and GEg are the third and fourth order moments of the net selectivity defined by Fama for a group of funds, in the present section we use the same approach to evaluate individual performance.

We can easily identify good managers from bad ones using this individual measure. A positive value of the Net Selectivity means a good performance, beating the passive portfolio, and a negative value may indicate a lower performance than the benchmark.

According to the we can rank successful managers in a proper way but we still cannot identify skilled managers from lucky ones.

As we base our analysis on the CAPM model but from a behavioral point of view, we approach managerial skill identification as follows: Given that CML can be taken as an explanatory model of portfolio returns, we can assume that $\epsilon$ values are the residual values of the following model:
\[ \widetilde{R}_p' = i + \frac{\widetilde{R}_{pp} - i}{\sigma_{pp}} \sigma_p + \varepsilon_{NS} \]

Where \( \widetilde{R}_p' \) is the portfolio’s return random variable, and \( \widetilde{R}_{pp} \) is the passive portfolio return random variable and \( \varepsilon_{NS} \) is the random residual corresponding to the Net Selectivity.

According to the assumptions of the CAPM, the expected value of this residual should equal zero and have a Gaussian distribution. Therefore if good performers can be identified by finding \( \epsilon_{NS} \) mean values different from zero, according to the EMH we could be observing an insufficiently long data series so the explanation may be randomness or luck. However, if we reject the null hypothesis that a given data sample belongs to a normally distributed population then we may infer some managing skills as a good explanation of abnormal success. In other words, we could determine if they are just lucky or if they have some managing skills by examining the probability that the sample belongs to a Gaussian distributed population or not. So we propose the Shapiro-Wilk test p- results in order to identify skill in high performing managers.

If we cannot discard the fund from belonging to a \( N(0, \sigma_p) \) distribution of probabilities we infer that good performance was due to randomness, if the Shapiro-Wilk test states that the sample has a low probability of belonging to a \( N(0, \sigma_p) \) distributed population, then we can infer skill as the cause of this good performance.

\[ \text{Figure 5: Net selectivity normality test} \]
In figure 5 we can see the NS probability distribution of fund A which has a positive mean value and a probability distribution very close to $N(\mu, \sigma_p)$. Figure 5 also shows the probability distribution of fund B which has the same positive mean value but with a lower probability to be normally distributed.

The mean positive value of $NS_A$ could be consequence of randomness and that if we had a wider observation series the $NS$ mean value would tend to zero, so we cannot discard fund A's success to be caused by luck. Fund B's $NS$ distribution has a lower probability to be normally distributed, so its mean positive value is more likely to have been caused by some kind of managerial skill.

**Empirical illustration**

In order to illustrate the theoretical results we reach in part two and three, we take a randomly determined sample of thirteen mutual funds investing in the U.S.A. market.

We collect daily market value from June 2005 to June 2012.

Funds can be classified in four different groups regarding the economical sector they invest in, being: Energy, Financial, Industry and Technology.

As passive benchmark portfolios we take the sectorial Dow Jones corresponding indexes: Dow Jones US energy, Dow Jones USA Financial Service, SPDR Dow Jones industrial, and Dow Jones U.S. Technology Index (^DJUSTC)

As a risk free asset proxy we take the ten years US bond yield.

**Groupal results**

As an indicator of group performance we take the GMSg (equation 3) indicator that is a passive portfolio based skewness measure. This measure shows if the funds in a certain group beat, by mean, the passive strategy portfolio, in this case the sectorial market index.

In Graph 1 we show a plot of the GMSg for each group of funds along the period of study. We cannot observe significant out or underperforming groups, so the only conclusion we reach is that there are no differences in level of success or failure in the long run, depending on the sector the funds invest in.
**Graph 1:** Group Management Success Indicator, GMSg  
Source: Compiled from information published on Bloomberg

**Level of activity/market efficiency measurement**

We calculate the GEs (equation 2) for the four sector groups. Given that we have a small sample of funds, this measurement might not be a significative market’s efficiency measure, but it might properly indicate the level of activity/passivity in strategies undertaken by managers in each market.

In Graph 2 we plot the GEs indicator for the four groups. It can be observed that the level of activity in the Technological sector is significantly lower than in the other three, being the Industrial sector the one in which managers undertake more active strategies.

**Graph 2:** Group Efficiency Indicator, GEs  
Source: Compiled from information published on Bloomberg
Randomness or ability as cause of individual managerial results.
We take the NS for each fund in the sample and test it to be distributed as a random residual by making the Shapiro-Wilk test.

The following table shows the funds in the sample classified by name, sector group, success/failure indicator and the source of these results according to the Shapiro-Wilk test.

<table>
<thead>
<tr>
<th>NAME</th>
<th>SECTOR GROUP</th>
<th>NS average</th>
<th>P-value</th>
<th>CAUSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vanguard Energy Fund Admiral</td>
<td>Energy</td>
<td>4,85E-05</td>
<td>&gt; 0.100</td>
<td>RANDOMNESS</td>
</tr>
<tr>
<td>Balckrock energy &amp; res</td>
<td>Energy</td>
<td>-1,01E-04</td>
<td>&lt; 0.010</td>
<td>No success</td>
</tr>
<tr>
<td>Fidelity adv Energy Fund T</td>
<td>Energy</td>
<td>1,24E-04</td>
<td>&gt; 0.100</td>
<td>RANDOMNESS</td>
</tr>
<tr>
<td>Russell GI Real State Sec-C</td>
<td>Financial</td>
<td>2,61E-04</td>
<td>= 0.036</td>
<td>ABILITY</td>
</tr>
<tr>
<td>Fidelity Adv Financial SVC-T</td>
<td>Financial</td>
<td>-1,02E-04</td>
<td>&lt; 0.010</td>
<td>No success</td>
</tr>
<tr>
<td>Financial Select Sector SPDR</td>
<td>Financial</td>
<td>-8,89E-05</td>
<td>&lt; 0.010</td>
<td>No success</td>
</tr>
<tr>
<td>Fidelity Adv Industrial FD-A</td>
<td>Industrial</td>
<td>-2,06E-05</td>
<td>&gt; 0.100</td>
<td>No success</td>
</tr>
<tr>
<td>Icon Industrials Fund-S</td>
<td>Industrial</td>
<td>-2,32E-04</td>
<td>= 0.047</td>
<td>No success</td>
</tr>
<tr>
<td>Ishares DJ US Industrial SEC</td>
<td>Industrial</td>
<td>-1,67E-04</td>
<td>= 0.08</td>
<td>No success</td>
</tr>
<tr>
<td>Columbia Selig Comm&amp;Inf-RS</td>
<td>Technology</td>
<td>8,69E-04</td>
<td>&gt; 0.100</td>
<td>RANDOMNESS</td>
</tr>
<tr>
<td>Ishares DJ US Technology SEC</td>
<td>Technology</td>
<td>2,60E-05</td>
<td>&lt; 0.010</td>
<td>ABILITY</td>
</tr>
<tr>
<td>Vanguard INF Tech Idx-Adm</td>
<td>Technology</td>
<td>1,32E-05</td>
<td>&lt; 0.010</td>
<td>ABILITY</td>
</tr>
<tr>
<td>Fidelity Select Electronics</td>
<td>Technology</td>
<td>-2,52E-04</td>
<td>&gt; 0.100</td>
<td>No success</td>
</tr>
</tbody>
</table>
Conclusions

In this paper we have approached the classical capital markets theoretical models from a behavioral point of view in order to improve investment funds performance evaluation.

We propose to base investment fund performance measurement in the difference between the fund’s portfolio Sharpe’s ratio and the Sharpe’s ratio of a portfolio that is investing in the same market but undertaking a pure passive strategy.

This proposal leads us to study the probability distribution of this distance measure, in order to analyze market efficiency and groupal performance.

We propose as a market efficiency indicator the fourth order moment of the distance measure according to the EMH based assumption that in a highly efficient market managers have no incentives to deviate from the passive strategy, so if the probability distribution of the distance measure is “peaky” shaped we infer a high level of efficiency and if this distribution is flat we might assume a lower level of efficiency given that managers do have higher incentives to intend beating the market by undertaking active strategies.

When applying this measure to our sample we find differences in the level of activity according to the economical sector the funds are investing in. We also observe that the third order moment of the distance measure is a good indicator of groupal success and taken for individual funds allow us to improve performance measurement by including in the function to be optimized not only maximization of return and minimization of volatility but also maximization of skewness.

Our sample shows that, even though there are differences in behavior between groups, positive and negative skewness get compensated in the long run which is coherent with the Efficient Markets Hypothesis.

By taking the CML as an explanatory model of portfolio’s return, we consider the Net Selectivity of a given fund as a random residual. By considering randomness as a cause of managers’ results, we test for normality of the NS assuming it to behave as a random residual to show that a random-caused managerial result might have a probability distribution that cannot be discarded to be normal, so we can only infer ability from those managers that do not have a normal distribution of their Net Selectivity.

By looking at classical models with behavioral eye we can improve markets efficiency measurement, we set the basis for three dimensional
performance evaluation and bring some new light into the difficult task of disentangling randomness from ability in investment funds managerial behavior.

References

In the last two decades in OECD countries there has been increased development of Social Responsible (CSR is the acronym of Corporate Social Responsibility) certified firms. This certification is assigned by public and private companies which guarantee that the behaviour of a certain firm is environmentally and sociologically correct. The first part of our work is devoted at establishing a certification index defined as the intersection of two of the three main international indices (Domini 400 Social Index, Dow Jones Sustainability World Index, FTSE4Good Index). The purpose of this is to overcome certain problems related to the multiplicity of CSR definitions and certifications. The sample obtained is a data panel of 417 enterprises (317 CSR firms and 100 firms as a control sample) belonging mainly to OCSE countries. The core of our analysis makes some probit analyses in order to study the structural causes that push enterprises towards social certification. The descriptive statistics, combined and supported by probit analysis, seem to stress the focal role of economic development as one of the main causes of social certification. Moreover, we have also studied the role of industrial sectors in social certification and other variables such as critical consumption and the structural production system of the enterprises.

**Keywords:** Corporate Social Responsibility, Growth.

**Jel Classification:** M14, C23, O10
Introduction

Over the past two decades, the term “Corporate Social Responsibility” (CSR, hereafter) has become part of everyday vocabulary, in line with the increasing number of CSR firms in OECD countries (see figures 1 and 2). It is also increasingly popular among scholars and operators in the debate on the sustainability of economic development.

The diffusion of a certain term clearly proves the propagation of the phenomenon, which should therefore be carefully investigated and analyzed, keeping in mind the potential ambiguity caused by generic usage. So, what does CSR mean? What are the main factors which push firms to adopt sustainable behaviour and then obtain certification?

In this article we will reflect on this topic, starting from an empiric research looking, through a quantitative approach, certain aspects related to the logics and dynamics behind the corporate social certification process. As we will see, a “macro” analysis like this, can help us not only to define the overall scenario, but also to identify more specific interpretations and more detailed research hypothesis.

Given the importance of the phenomenon, the economic literature has begun to develop the theme of sustainability and CSR. The economic debate has mainly focused on three aspects: first, the very definition of CSR (see Garriga and Mele, 2004; Dahlsrud, 2008, Beurden and Gossling, 2008, etc.) and how it can be measured (Türker, 2008), secondly the main reasons which lead companies to adopt sustainable behaviour and subsequently obtain certification (Sotorrio and Sanchez, 2008; Detomasi, 2007; Udayasankar, 2007), and thirdly the effect of CSR on the economic and financial system (Beurden and Gossling, 2008; Sotorrio and Sanchez, 2008).

Given that currently definitions of CSR are not homogeneous (Dahlsrud, 2008), it is difficult to give the concept a single defining definition. Moreover, given that CSR is “not a variable and therefore it is not measurable”, the economic literature has introduced the concept of Corporate Social Performance (CSP), conceived to make CSR applicable and practical (Maron

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1 CSR can be defined as ‘a business organization’s configuration of principles of social responsibility, processes of social responsiveness, and policies, programs, and observable outcomes as they relate to the firm’s societal relationships’ (Wood 1991a: 693).

2 This term defines those firms that adopt ethical behaviour, both in the environmental field (respecting biodiversity, adopting environmentally friendly fuels, using alternative energy sources, reclaiming polluted areas, etc.), and in purely business (improving workers’ conditions, respecting all types of diversity, allowing for good governance and transparency in the management of business, etc.). See Dahlsrud (2008).
2006). Even if CSP is difficult to measure, it can be transformed into measurable variables. Beurden and Gössling (2008), in line with Sotorrio and Sanchez (2008), describe CSP as “a concept of three categories”: CSP1: social disclosure about social concerns (Wu, 2006; Orlitzky et al., 2003); CSP2: corporate action, such as philanthropy, social programs and pollution control; CSP3: corporate reputation ratings or social indices that may be provided by social rating institutions, such as KLD, EIRIS; Fortune, Moskowitz, or ad hoc indices drawn up by researchers themselves (Beliveau et al., 1994; Brammer et al., 2006; Hillman et al., 2001; Johnson and Greening, 1999; Mahoney and Thorne, 2005; Moore, 2001). In this regard, this paper refers to the category CSP3.

However, the perception of increasing numbers of CSR companies in the context of CSP3 is partially distorted for two reasons. Firstly, there is no unambiguous definition of “socially responsible”. Secondly, since the creation of CSR, there has been a proliferation of certification agencies, evaluating firms on the basis of widely varying non-standard criteria. Both of these reduce the value to certification itself.

Regarding the impact of CSR on the economic system, several papers (Beurden and Gossling (2008); Sotorrio and Sanchez (2008), Orlitzky et al., 2003; Garriga and Mele, 2004; Kitzmueller, 2008) have analyzed this relationship, focusing primarily on the link between CSR and the financial performance of the certified firms. However, the effect of CSR is reflected on the whole economic system, in line with the stakeholder theory. Therefore, there are different CSR effects to be classified according to different variables. Concerning this point, research shows that there is a difference in the prediction of financial performance between market-based accounting measures and CFP-based measures of CFP (Orlitzky et al., 2003; Wu, 2006).

Beurden and Gössling (2008) use CFP as an instrument to measure economic performance. It consists of two categories. CFP 1 incorporates market-based measures including stock performance, market return, market value to book value, price per share, share price appreciation and other market based measures; CFP 2 is the second category for measuring CFP, incorporating accounting-based measures.

For the factors that drive companies to CSR, research into corporate social responsibility is related to the analysis of value creation (Alexander and Buchholz, 1978; Belkaouï, 1976; Clarkson, 1995; Harrison and Freeman, 1999; Preston and O’Bannon, 1997; Kohers and Simpson, 2002; Vance, 1975; Waddock and Graves, 1997). Moreover, Sotorrio and Sanchez (2008) identify

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3 The central idea in stakeholder theory is that the success of an organization depends on the extent to which the organization is capable of managing its relationships with key groups, such as financers and shareholders, but also customers, employees, and even communities or societies.
different “starting points”: a) disclosure of information about social natures (Belkaoui and Karpik, 1989; Brammer and Pavelin, 2006, Fernandez Sanchez and Sotorrio, 2008; Roberts, 1992; Stanwick and Stanwick, 2006); b) the reasons behind spending on social performance, such as donations, philanthropy, etc. (Adams and Hardwick, 1998; Amato and Amato, 2007; Brammer and Millington, 2004, 2006; Navarro, 1988); c) a variety of principles, processes, policies, programmes and observable results relating to a company’s relations with society. In the latter case, certain social indices, credit ratings are provided by social institutions, such as EIRIS or KLD, or ad hoc indices drawn up by researchers themselves (Beliveau et al., 1994, Brammer et al., 2007, Hillman et al., 2001; Johnson and Greening, 1999; Mahoney and Thorne, 2005; Moore, 2001).

One of the main aims of our work consists in building a CSR index that intersects two of the three main international indices (Domini 400 Social Index, Dow Jones Sustainability World Index, FTSE4Good Index), in order to partially solve the problem related to multiple CSR definitions and certifications.

Our second purpose is to make some probit analyses by using a panel dataset, trying to find the structural causes which push enterprises to adapt social certification. The descriptive statistics combined and supported by probit analyses, seem to stress the focal role of the economic development as one of the main causes of social certification. Moreover we have studied the role of industrial sectors in social certification and other variables like critical consumption and the structural production system of the enterprises.

Our paper is organised as follows: in paragraph 2 the construction of the sample is explained, paragraph 3 shows the results of some descriptive statistics, paragraph 4 shows the data used to run our analysis. In paragraph 5 the aim of this study is formalized and better explained and the complete results are shown. Our conclusions are presented in paragraph 6.

The Sample

The first problem faced while building the sample was related to the redundancy of social certification. One way to overcome this problem is as follows: either to identify the best (most influential) rating agencies and take only the criteria that they express, or to use multiple assessments, so that an enterprise’s certification can be confirmed by several rating agencies. In our opinion, the most powerful way is a combination of the two solutions, i.e., use
multiple evaluation criteria characterized by good quality (Poddi and Vergalli, 2009). Therefore, our paper’s first goal consists in defining a database of CSR firms that combine more than one certification index. Specifically, we selected the firms in our sample following the steps below:

1. First, we assumed that the group of corporate responsible firms includes enterprises which belong to at least two of the three main stock option indices of the market in 2004\(^4\) (i.e. Domini 400 Social Index, Dow Jones Sustainability World Index, FTSE4Good Index\(^5\)). We then tried to complete the methodology used by Barnea and Rubin (2005) and by Waddock and Graves (1997). In this way, we obtained a sample consisting of 317 suitable firms.

2. In the second step, in order to build the control sample, we chose 100 non-CSR enterprises, to make it homogeneous for sectors with the CSR sample. For each economic sector, several firms were randomly chosen from the Dow Jones Global Index.

3. The selection process generated a sample consisting of 417 firms. In order to generate the time series necessary for our analysis, we started with the 2004 sample, and maintaining the total number of firms we worked backward until 1999, changing the non-CSR/CSR ratio\(^6\). After building our database (see the appendix), we downloaded the balance sheets of all 417 firms, using Perfect Analysis software\(^7\).

### Descriptive Analysis

In Figure 1, we show the number of CSR firms from 1999 to 2009, according to the DJSI (Dow Jones Sustainability Index)\(^8\). We can see how the

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\(^4\) In this sense we took the most famous and recognizable indices at an international level. The choice of year (2004) was due to our need to include the highest number of firms in our sample, given the novelty of this peculiar economic phenomenon.

\(^5\) For the stock market analysis, we referred to the following webpage: http://www.sustainable-investment.org/.

\(^6\) We started from the 2004 sample and we created a dummy variable for each year from 2004 to 1999, imposing the number 1 if that firm was certified as a CSR company in that year and zero otherwise, by using the intersection (for a couple of sets) of the three indices. We were not able to work further back than 1999 because the CSR firms available in our database were not sufficient. For the FTSE index we referred to the website: http://www.sustainability-indexes.com/html/assessment/2003.html; for the Domini Social Index the data refer to the Domini 400 SocialSM Index (DS 400 Index).

\(^7\) Perfect Analysis contains the panel data of the stock prices, the level of dividends, and also other financial information about firms’ balance, exchange rates and market indices. Moreover, it contains the main OECD economic indicators.

\(^8\) In our previous paper (Poddi and Vergalli, 2009) we showed the number of CSR firms and their growth rates, by using the sample built as described above. In this version, we update our data and we try to show the most recent data. In detail, each year the DJSI creates a ranking of the most virtuous enterprises in terms of social responsibility. Since 2004 the number of firms belonging to the DJSI has been almost constant and equals 318. However, a large turnover among firms can be noted, which
diffusion of the CSR phenomenon is not homogeneous from a geographical point of view. Indeed, Figure 1 shows nearly all firms belonging to developed countries\textsuperscript{9}. The proliferation of sustainable indices may be a litmus test for the diffusion of the phenomenon. It is not a coincidence that most sustainability indices come from OECD countries. As such, recent studies have pointed out that social responsibility is influenced by the level of economic development. From figure 1, it can be seen that:

- the number of CSR enterprises has increased considerably, showing that “Corporate Social Responsibility” is a very relevant phenomenon which requires detailed investigation;
- the highest number of CSR enterprises is from the United States and the European Union, i.e., two of the most developed areas. From this first rough observation, we can infer that GDP is a crucial variable for the development of ethical conscience and therefore CSR.

In order to describe our database and the growth of CSR firms better, in figures 2 and 3 we show, the number of CSR firms per capita for each year, and the gross domestic product per capita of our database.

From these data, we can see that the number of the CSR enterprises seems to depend on the economic development of the area referred to and is not only time-related. In figure 2, although the EU has fewer enterprises than the USA, its growth rate is higher, probably because of the catch-up phenomenon. It is also important to note in figure 3 that the relation of the number of CSR enterprises and GDP per capita is the same but shows two groups with different curves\textsuperscript{10}. In any case, from our brief descriptive analysis, GDP seems to be a very important variable for CSR.

\textsuperscript{9} Nevertheless, it should be noted that the type of index adopted is of crucial importance: use of the DJSI influences selection of the sample in figure 1. In recent papers (i.e. Muller and Kolk, 2008), there is a study of CSR in emerging countries.

\textsuperscript{10} See, Poddi (2006) for more details.
Figure 1: ROW includes Brazil, Chile and South Africa, EU-1 includes Austria, Belgium, Denmark, Finland, Greece, Ireland, Norway, Portugal, Sweden; ASIA-1 includes India, Indonesia, China, Malaysia, Singapore, Thailand, Taiwan, Hong Kong.

Figure 2: CSR and GDP per capita dispersion graph for EU and USA
In order to identify the analytical variables, we referred to the existing literature, but also developed new focal variables, which we will introduce in the following paragraphs.

**Size**

Waddock e Graves (1997) hypothesized that larger companies are able to act more responsibly than smaller ones. We can therefore say that larger companies allocate part of their investment in activity bound to create or improve a relation with all the company’s stakeholders. In this way, companies try to secure a greater acceptance from local communities and public opinion.

To measure the size of a company the number of employees, property value or total sales should be taken into account. However, Cowen et al. (1987) e Patten (1991) used the Fortune 500 index and the natural logarithm of sales. We will use company sales. In our work, total sales have been used to define a company’s size, as illustrated by Stanwick and Stanwick (1998), based on the

**Figure 3:** CSR and GDP per capita dispersion graph for all countries
work of Fonbrun and Stanley (1990) and Cowen et al. (1987).

**STLT (Short Term Debt / Long Term Debt)**
Myers (1977) and Wallace et al. (1994) found a positive correlation between leverage, the accounting value of debt over shares value and social responsibility. Therefore, in our work STLT is the ratio between short-term/long-term debt. Considering the important role of indebtedness, we wanted to discern its type. Data source: Perfect Analysis - “Common Size “ST Debt (% of Assets)” and “LT Debt (% of Assets).”

**INTE (intensity of work)**
We will then consider the ratio between number of employees and total assets. In the Perfect Analysis database - “profit and loss” - data were collected on the number of employees under the heading “Employees Units”. For total assets: balance sheet “total assets”.

**GDP**
The analysis was continued by confronting the increase of CSR companies with the variations of the per capita GDP during the years considered. This was to hypothesize a positive connection between growth and socially responsible investments carried out by companies, as we have briefly observed by figures 2 and 3. The data used were taken from the World Bank’s database.

**Critical Demand, D**
Socially responsible companies improve their image on the market since consumers are often interested in brands and companies with a good CSR reputation. From benefits such as visibility and reputation stem a diversification advantage (Fombrun, 1996; Fombrun e Von Riel 2003), which can have positive consequences in terms of increasing and retaining customers, leading to more sales. This can lead companies to adopt social certifications as a strategic choice based on the theory of critical demand: the larger the group of critical consumers, the larger their request for innovative products to satisfy their needs. The data used in this paper come from a research carried out by MORI (Market and Opinion Research International)\(^\text{11}\).

**Sector**
The characteristics of an industrial sector can potentially influence

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11 MORI (Market and Opinion Research International) – www.mori.com
the responsible practices of a company. Dierkes and Preston (1977) found that companies whose economic activities modify the environment are scrutinized more with regard to their environmental performance than companies operating in other sectors. Consumer oriented companies on the other hand, might be interested in showing off their social commitment, in order to positively influence their reputation and ultimately, increasing their sales (Cowen et. al., 1987).

As regards CSR industrial sector, their composition is indicated in Tab. 1. The definition of the percentage for each sector is useful in order to create a homogeneous control sample, composed of non-CSR companies in July 2004, and also to understand the relation between industrial affiliation and firm propensity towards CSR certification.

<table>
<thead>
<tr>
<th>Industrial Sector</th>
<th>Freq.</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discretionary consumption</td>
<td>90</td>
<td>21.6</td>
</tr>
<tr>
<td>Basic consumption</td>
<td>30</td>
<td>7.2</td>
</tr>
<tr>
<td>Energy</td>
<td>12</td>
<td>2.9</td>
</tr>
<tr>
<td>Finance</td>
<td>110</td>
<td>26.4</td>
</tr>
<tr>
<td>Health</td>
<td>26</td>
<td>6.2</td>
</tr>
<tr>
<td>Industry</td>
<td>51</td>
<td>12.2</td>
</tr>
<tr>
<td>Information technology</td>
<td>44</td>
<td>10.6</td>
</tr>
<tr>
<td>Materials</td>
<td>22</td>
<td>5.3</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>26</td>
<td>6.2</td>
</tr>
<tr>
<td>Utility</td>
<td>6</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Adopting the definitions listed in the SIC (Standard Industrial Classification):
- "discretionary consumption" indicates the following products: household appliances, entertainment, cars, clothing, hotel, retail and leisure. They are the goods with a reducing demand in case of economic downturns;
- “basic consumption” means food, beverages, tobacco, personal and household products;
- “energy” refers to the extraction and refining of oil and gas;
- ”finance” includes banks, financial services, insurance;
- “Health” includes services and equipment for health, pharmaceuticals and biotechnology;
- the sector “industry” includes: transportation, aerospace, defense, construction, electrical, industrial conglomerates, machinery, commercial
services, transport infrastructure (airports, railways, ports);
  • “information technology” includes software, hardware, tools and electronic equipment, semiconductors;
  • in “materials” chemicals, building materials, container, metals and mining, paper are inserted;
  • “telecommunications” include diversified services and wireless;
  • “utility” includes the distribution of electricity, gas, water and multi-services.

From Table 1, we see that a fifth of CSR companies are in the “finance” group therefore, banks, insurance and securities services in general. This may be due to two peculiar characteristics of this sector: on the one hand, these companies have lower costs for social certification than firms in other sectors. This is because of their smaller involvement in activities which cause negative externalities. On the other hand, given that this sector is characterized by low capital intensity, it can easily convert its activities into socially responsible ones. Table 1 can therefore be read in light of the following interpretations: i) low capital intensity, ii) a lower impact through negative externalities; iii) ease of conversion of production and therefore lower costs. Following this analysis, it is not surprising to observe how the group “energy” is poorly represented, as it is the group linked to the “consumer base” to which tobacco belongs. At the same time, again not surprising, a large number of computer companies belong to this group.

**Empirical Analysis**

In this section we study whether the role of economic growth and GDP per capita, affects a firm’s choice to become a CSR firm. To do this, we developed a probit analysis in which CSR is the dichotomous dependent variable and is equal to 1 for CSR firms and zero otherwise. Our analysis concerns the probability of regressors to affect dependent variable.

Specifically, we have regressed the following equation:

\[
CSR_{it} = a + \beta_1 \text{SIZE}_{it} + \beta_2 \text{STL}_{it} + \beta_3 \text{INTE}_{it} + \beta_4 \text{GDPFC}_{it} + \beta_5 \text{DIC}_{it} + \beta_6 \text{GDPG}_{it} + \beta_7 \text{GDPC}_{it-1} + \eta_i + \nu_t + \epsilon_{it} \quad (1)
\]

Where the dependent variable is the probability of being a CSR firm for each firm (i), in country (c) and year (t). The regressors or independent variables are represented by the following variables: a) SIZE: the dimension of
each firm which is 1 for small enterprises, 2 for medium enterprises and 3 for the biggest ones according to the amount of sales; b) STLT: the ratio between long and short-term debt; c) INTE: the intensity of work, calculated as the ratio between the number of employees over the total asset; d) GDPPC is the gross domestic product per capita for each country and year; e) D: the critical demand; f) GDPGct: the growth of the gross domestic product; g) GDPGct-1: the growth of the gross domestic product lagged one year. The regressions are made taking into account geographical (\( n_c \)) and time (\( v_t \)) fixed effects.

In table 2, we show the model with the most interesting results.

<table>
<thead>
<tr>
<th>Model</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \beta )</td>
<td>(-3.1 ) &amp; (-4.7) &amp; (-3.3) &amp; (-4.3) &amp; (-5.8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( z- )</td>
<td>(-6.1) &amp; (-6.5) &amp; (-6.9) &amp; (-6.5) &amp; (-6.5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIZE</td>
<td>(0.6) &amp; (4.5) &amp; (0.5) &amp; (4.0) &amp; (0.5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \beta )</td>
<td>(-1.7) &amp; (-1.4) &amp; (-0.6) &amp; (-1.3) &amp; (-0.5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( z- )</td>
<td>(-6.1) &amp; (-6.5) &amp; (-6.9) &amp; (-6.5) &amp; (-6.5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| STLT (a) | \(0.50\) & \(0.9\) & 
| INTE | \(-0.007\) & \(-0.8\) |
| GDPPC | \(0.00008\) & \(5.5\) & \(0.00007\) & \(4.1\) & \(0.00006\) & \(5.9\) & \(0.00008\) & \(3.8\) & \(0.00008\) & \(4.0\) |
| \( \beta \) | \(0.00008\) & \(5.5\) & \(0.00007\) & \(4.1\) & \(0.00006\) & \(5.9\) & \(0.00008\) & \(3.8\) & \(0.00008\) & \(4.0\) |
| \( z- \) | \(-6.1\) & \(-6.5\) & \(-6.9\) & \(-6.5\) & \(-6.5\) |
| D (a) | \(0.00073\) & \(12.7\) & \(0.00068\) & \(11.4\) & \(0.00093\) & \(9.0\) |
| \( \beta \) | \(0.00073\) & \(12.7\) & \(0.00068\) & \(11.4\) & \(0.00093\) & \(9.0\) |
| \( z- \) | \(-6.1\) & \(-6.5\) & \(-6.9\) & \(-6.5\) & \(-6.5\) |
| GDPG | \(-0.10\) & \(-2.7\) & \(-0.15\) & \(-3.22\) |
| \( \beta \) | \(-0.10\) & \(-2.7\) & \(-0.15\) & \(-3.22\) |
| \( z- \) | \(-6.1\) & \(-6.5\) & \(-6.9\) & \(-6.5\) & \(-6.5\) |
| GDPGct-1 | \(0.11\) & \(2.06\) |
| \( \beta \) | \(0.11\) & \(2.06\) |
| \( z- \) | \(-6.1\) & \(-6.5\) & \(-6.9\) & \(-6.5\) & \(-6.5\) |

Where:

\( \bar{R}^2 \) is the adjusted \( R^2 \); \( \beta \) is the coefficient value; “\( z- \)” is the z stat with significance:

(*) 90% Significant; (**) 95% significant; (***) 99% significant; (a) the data are multiplied for 10^{-9}.

Our first model takes into account the main variables which affects each firm to apply for CSR certification. The first insight stresses that one of the main focal variable which determines CSR choice, is SIZE. Given that SIZE has been built by taking into account total sales, the higher the total sales, the higher the funds useful for investment in new markets. In particular, each firm can also invest in socio-environmental activities and so obtain CSR.  

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12 For details, see Poddi, L. (2006), paragraph 4.7.

13 It is important to stress that panel regressions have a low \( R^2 \). This is due to the inter-temporal interpolation of data. Indeed, the panel is a merge of cross analysis with a historical series. Its explanatory function is between the two methods. The difference compared with the historical series is that there is a difference between individuals. For this reason we should see an \( R^2 \) quite similar to that of the cross section. We must therefore calculate the \( R^2 \) using the methodology adopted in these cases.
certification. So, it signals its “type” and its peculiar characteristics obtaining advertisements in the markets.

A further insight is strictly linked with the definition of this variable: under a given limit, increasing its size, the firm has an economy of scale. This means that average costs decrease with size. For this reason, the costs for certification may be cheaper than for smaller enterprises. Moreover, a large size usually entails, a wide range of shares and so a multiplicity of interests that must be satisfied. In case a firm’s management has no clearly identifiable goals, initially its priority must be to satisfy stakeholders’ interests and only afterwards to pursue universally accepted ethical principles, (see, Waddock and Graves, 1997 and Orlitzky, 2001).

Summarizing, the bigger the company, the higher the probability of more investment to satisfy all stakeholders. In this way, the firm obtains acknowledgement from public opinion.

In our regression GDPPRO is significant. This implies that the higher the GDP per capita, the higher the probability of becoming a CSR firm. The economic intuition behind this implies the syllogism that in a rich country (high GDP per capita), after having satisfied its elementary needs, an individual could develop a social sensibility. The indirect result is that the higher the social sensibility, the higher is the number of CSR firms.

INTE and STLT are not significant. As far as STLT is concerned, we can expect that the debt structure might recombine with a rise of long term debt. Nevertheless:

• this change might happen ex post the choice to become CSR by considering what are total costs and so, the debt weight, of certification;
• given that we have only 6 horizon years for our regression, these data are not sufficient to obtain sufficient information about dept and its effects;
• given that we know that the CSR firms have high sale values, even if the debt structure changes, it might be a negligible percentage compared to total sales.

As far as INTE (and in details, human capital intensity) is concerned, this depends on the different type of industrial sectors of CSR firms. For enterprises with high environmental impact, we expect that they might invest to reduce polluting output. This entails a change in industrial resources and so in capital. For high labour intensity firms, our expectation is a change in labour organization. These two different kinds of investment imply that the relation between the probability certifying as a CSR firm and human capital intensity is unclear. Nevertheless, if we focus on the costs that each firm should face in
order to become CSR, the costs that a oil company or a potentially pollutant firm must bear are certainly higher than companies with high labour intensity, such as in a bank. Indeed, in the first case, not only is the investment higher but it should also be used to control potential damage or reduce produced pollution.

In light of these insights, we can give a reason for the high percentage of banks and financial societies in the CSR database. Nevertheless, in our analysis, the relation between CSR and INTE is not significant because the control sample is homogeneous for the CSR group and therefore, probit regression cannot underline the difference in capital intensity.

Continuing our analysis of table 2, we can see that both models 2 and 3 show the main significant variables and omit standard less important variables. We can see the significance of critical demand, even if it has a low impact. By looking at the three regressors, we notice that: even if the significance of SIZE is evident, it is not the same for the joint significance of GDPPRO and DEMAND. Indeed, we expected an overlap of these two variables, because both explain the increased importance of sustainability and CSR. The coexistence of CSR and DEMAND implies that the two variables treat different facets of increasing wealth. On the one hand, critical demand increase CSR firms as being CSR is profitable. On the other hand, high GDP entails high financial resources for investment including sustainable investment. Therefore, if high GDP implies high investment and so more CSR firms, CSR development might be strongly pro cyclical.

By following this last insight, in models 4 and 5, we have added GDP growth rate and the lagged GDP growth rate. By looking at model 4, we can underline that there is a negative significant relation between the probability of becoming CSR and GDP growth rate. What could be the explanation of this finding? A possible answer is that the two variables are linked but with a time lag. This fact entails that, if we observed tendency changes over the short term, the statistical software we use should recognize our variables as being negatively correlated. This intuition is hinted at in model 5 in which we added GDPG with one lag (PILG_1). Therefore, our results suggest that GDP per capita affects CSR certification.

Debate and conclusions

The recent debate on CSR is confirmed in the increased number of
companies interested in obtaining CSR certification. As already mentioned, this is a relevant phenomenon that has interesting implications in several economic fields. In order to analyze this topic further, we need to understand the social certification phenomenon as a starting point. It is especially important to investigate why companies decide to sustain the costs required for certification. Our results allow us to distinguish different aspects, and to offer certain reflections.

Firstly, the remarkable growth over the past decade of certified companies does not seem to be evenly distributed in all countries analyzed. At first glance, it seems that this asymmetry is due to the link between the probability of classifying a company as CSR and the economic development of the country. Both the descriptive and econometric analyses confirm the positive relationship between these two elements.

Our investigation has also revealed a time gap that helps to explain the meaning and significance of this report. The increase in income per capita tends to develop consumer awareness of corporate social responsibility issues. It therefore increases so-called “critical consumption”, which rewards companies which just can enter the market with an image consistent with expectations. Competition between firms changes and at the same time creates new business opportunities related to a critical demand and new market segments. Increased certifications is therefore the answer at least, at a level of external communication. The response, however, is not instantaneous, but requires a certain amount of time.

At the same time economic development and demand for critical consumption seem to explain social certification. Here, we can also offer certain additional reflections. On the one hand, it is quite clear that increased revenues are correlated with increased financial investment in activities not strictly related to the production cycles of the company, such as various forms of advertising and signaling. Moreover, size is certainly related with economies of scale and therefore with lower marginal costs, compared to smaller firms. This then supports access to niche market segments, such as segments associated with critical consumption. It should also be noted that if one can assume that both of these elements are relevant in determining the higher propensity to certification by large companies, on the other hand they seem to suggest completely different interpretations, which could almost be contradictory.

The first aspect, seems to suggest that the certification is to be interpreted as a social activity primarily, with the ability of corporate communication, rather than actual “ethical” or socially responsible behavior. In other words, the company is certified not because it decides to redefine
their strategies and / or redesign its organization, but because it can support large investments in shares. These have a principally communicative value e.g., advertising campaigns and targeted sponsorships, for solidarity and support to social causes that meet the public’s aspirations and which are sufficient to meet certification requirements.

The second element, however, points to cost structures capable of supporting important and substantial organizational changes in the manufacturing process and relations with internal and external stakeholders. This, of course in terms of economic rationality, creates synergy with social and ethical aims. In short, it effectively reorientates business practices towards ethical and social responsibility.

We cannot say, though in general which is the more relevant argument. Again, more targeted and qualitative studies of specific sectors and individual companies need to be made in order to answer this question.

A third important element is the low (or zero, statistically) relevance of the “labor intensive” variable for certification. Like the previous ones, this element should be looked at in the context of the sector they belong to, to be interpreted more precisely. In our analysis, this is apparent from the ad hoc construction of the control sample, which is derived consistent with the sectorial composition of the CSR sample. This homogeneity implies the absence of sectorial significance in the probit analysis.

However, from a theoretical point of view, we can propose certain reflections on this matter. We could say that there is a certain kind of understanding by companies on the real meaning of social certification. If we review the areas of corporate social responsibility (the environment, market, work), we can still notice that there is a low or no relevance for the intensity of work, which could affect estimates and reduces their significance. In contrast (and consistent with the previous statement of GDP and firm size), applying the logic of social responsibility concerns mainly relations with the outside world, i.e., the most “visible” and therefore more readily appreciated on the market: environmental sustainability, relations with local communities, and relations with customers and the market.

References


Review, 6 (4):691-718.


Table 1: Industrial composition of the sample

<table>
<thead>
<tr>
<th>Industrial Sector</th>
<th>Freq.</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discretionary consumption</td>
<td>90</td>
<td>21.6</td>
</tr>
<tr>
<td>Basic consumption</td>
<td>30</td>
<td>7.2</td>
</tr>
<tr>
<td>Energy</td>
<td>12</td>
<td>2.9</td>
</tr>
<tr>
<td>Finance</td>
<td>110</td>
<td>26.4</td>
</tr>
<tr>
<td>Health</td>
<td>26</td>
<td>6.2</td>
</tr>
<tr>
<td>Industry</td>
<td>51</td>
<td>12.2</td>
</tr>
<tr>
<td>Information technology</td>
<td>44</td>
<td>10.6</td>
</tr>
<tr>
<td>Materials</td>
<td>22</td>
<td>5.3</td>
</tr>
<tr>
<td>Telecommunications</td>
<td>26</td>
<td>6.2</td>
</tr>
<tr>
<td>Utility</td>
<td>6</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Table 2: Probit Model, dependent variable: CSR.

<table>
<thead>
<tr>
<th>Model</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>-3.1</td>
<td>-6.1</td>
<td>-8.5</td>
<td>-6.6</td>
<td>-6.9</td>
</tr>
<tr>
<td>SIZE</td>
<td>0.5</td>
<td>0.5</td>
<td>0.6</td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td>INTE</td>
<td>0.007</td>
<td>0.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDPPC</td>
<td>0.00008</td>
<td>5.5</td>
<td>4.1</td>
<td>3.9</td>
<td>3.8</td>
</tr>
<tr>
<td>D (a)</td>
<td>0.00073</td>
<td>12.7</td>
<td>11.4</td>
<td>10.9</td>
<td>9.0</td>
</tr>
<tr>
<td>GDPG</td>
<td>-0.10</td>
<td>-2.7</td>
<td>-0.75</td>
<td>-2.22</td>
<td></td>
</tr>
<tr>
<td>GDPG-</td>
<td></td>
<td></td>
<td>0.11</td>
<td>2.06</td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>0.45</td>
<td>0.417</td>
<td>0.42</td>
<td>0.45</td>
<td>0.46</td>
</tr>
</tbody>
</table>

Where: $\hat{R}^2$ is the adjusted $R^2$; $\beta$ is the coefficient value; “z-” is the z stat with significance: (*) 90% Significant; (**) 95% significant; (***) 99% significant; (a) the data are multiplied for 10-9.

17 For details, see Poddi, L. (2006), paragraph 4.7.

18 It is important to stress that panel regressions have a low R2. This is due to the inter-temporal interpolation of data. Indeed, the panel is a merge of cross analysis with a historical series. Its explanatory function is between the two methods. The difference compared with the historical series is that there is a difference between individuals. For this reason we should see an R2 quite similar to that of the cross section. We must therefore calculate the R2 using the methodology adopted in these cases.
Knowledge Transfer in Service-Business Acquisitions

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Kirstimarja Blomqvist, Lappeenranta University of Technology, School of Business, Finland, kirstimarja.blomqvist@lut.fi

In the post-acquisition integration process, organizations need to transfer different types of knowledge from one organization to another in order to align their operational routines, practices and culture. Our aim is to identify the critical factors that relate to knowledge transfer in terms of the different knowledge types. We conducted a qualitative case study from an exploratory perspective. We first selected a case firm operating in the knowledge-intensive business services (KIBS) field and then incorporated four different acquisition cases into the study. The results focus attention on the need to understand the “soft types” of critical factors in knowledge transfer, such as valuing employees, easing interpretation, identifying employee competences, building trust, creating a safe atmosphere, and diagnosing knowledge cultures in order to avoid information-management bias. It is necessary to identify the nature of the knowledge to be transferred to the acquired companies, and to align the communication patterns accordingly.

Keywords: knowledge, knowledge transfer, services, service business, acquisition

Introduction

Knowledge transfer is defined in the literature as a process through which one unit is affected by the experience of another (Argote & Ingram, 2000; Szulanski, 2000). Understanding knowledge transfer is accentuated in the knowledge-based view of the firm (Grant, 1996), which is seen as a vehicle for integrating knowledge. Path-dependent, specialized and dispersed knowledge is a critical source of value, yet firms differ in their ability to transfer it. Knowledge transfer is therefore a crucial aspect of various intra- and inter-
firm relations varying from inter-departmental coordination to knowledge management in multinational firms, customer relationships, alliances and acquisitions.

Knowledge-intensive business-to-business services (KIBS) are co-created in close interaction with knowledgeable individuals and supporting systems. The intangible and heterogeneous nature of services and the inseparability of service provision and use make service-related knowledge transfer complex and therefore especially challenging. Service-business-related knowledge is deeply embedded in humans, as well as in systems, structures and processes.

Our focus in this paper is on service-business acquisitions, which is a major means of business growth. Acquisitions offer potentially faster and more efficient access to knowledge than organic growth (Bresman et al., 1999). In terms of value-creating opportunities the issue of knowledge transfer is of particular importance in acquisitions, which involve the transfer of complex bodies of organizational knowledge. We concentrate on the post-acquisition integration process, especially the first 12 months preceding the state of organizational integration.

Much of the knowledge needed to produce services is tacit in nature and therefore difficult to transfer (e.g., Ritala et al., 2011). However, as Guzman (2008) notes, prior research on knowledge transfer has overlooked practical knowledge. Most studies focus on explicit forms such as technology-related knowledge (Bresman et al., 1999), or take a purely analytical view at the expense of understanding how knowledge is transferred in practice (Jasimuddin, 2007). We claim that it is useful to approach the issue from a more practical perspective, when different types of knowledge need to be transferred from one organization to another in order to align the operational routines, practices and culture. Hence, our aim in this paper is to identify the critical factors related to knowledge transfer in terms of the different types of knowledge involved.

**Literature review**

Knowledge is transferred through the interactions of organizational members and units (Grant, 1996), in other words it involves both individual and organizational levels and their interplay. Four types of factors appear to affect the transfer (Leonard-Barton, 1990; Rogers, 1983; Teece, 1977). These factors are related to the characteristics of the knowledge being transferred (e.g., causal ambiguity, unproven usefulness), of the source (e.g., motivation,
reliability), and of the recipient (motivation, absorptive capacity, retentive capacity, i.e. institutionalizing the utilization of new knowledge), and finally to the context in which the transfer takes place (involving aspects such as formal structures, coordination and the nature of relationships). (Szulanski, 1996)

Let us first consider the nature and type of knowledge in more detail. Kogut & Zander (1992) present two seminal typologies of knowledge, namely the organizational knowledge consisting of information (facts) and know-how (skills and higher-order organizing principles) existing on the individual, group, firm and network levels. Spender (1996) describes types of organizational knowledge as either tacit or explicit, and further builds his typology on conscious (explicit) knowledge held by the individual vs. objectified (explicit) knowledge held by the organization, as well as on automatic (preconscious) individual knowledge vs. collective (highly context-dependent) knowledge manifested in organizational practice.

Grant (1996), together with Nonaka & Takeuchi (1995) and Tsoukas (1996), consider explicit and tacit knowledge “inseparably related”. According to Tsoukas (1996), an individual’s knowledge may consist of 1) role-related normative expectations, 2) dispositions formed in past socialization and 3) local knowledge of particular circumstances of time and place. He sees a firm’s knowledge as emergent, not possessed by a single agent, partly originating “outside” the firm, and very complex at any point. According to Nonaka & Takeuchi (1995) and Spender (1996), organizational knowledge evolves through social interaction between tacit and explicit knowledge. In practice these different types and phases of knowledge creation can be difficult to observe given that the conceptual categories used to classify them are rarely discrete, separate or stable (Tsoukas, 1996).

Thus a firm acquiring another firm deals with various types of distributed knowledge embedded in individuals, systems and processes. We can infer from Spender’s (1996) typology that the conscious and explicit knowledge held by an individual is rather easy to transfer if the individual is motivated, willing and understands its value (see also Szulanski, 1996). The objectified and explicit knowledge held by the organization is also relatively easy to transfer between the acquired and the acquiring firm. Both automatic and preconscious individual knowledge, as well as collective and contextual organizational knowledge are much more challenging. Table 1 gives a summary of the various knowledge types.
Table 1: Types of knowledge: explicit-implicit and individual-collective dimensions (Spender, 1996)

<table>
<thead>
<tr>
<th></th>
<th>Individual</th>
<th>Collective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explicit</td>
<td>conscious knowledge/e.g., facts, concepts, frameworks stored in the mind</td>
<td>objectified knowledge/e.g., process documentation, systems, databases</td>
</tr>
<tr>
<td>Implicit</td>
<td>automatic and preconscious knowledge/e.g., perceptions, values, behavioural tendencies, technical skills</td>
<td>collective and contextual knowledge/e.g., systems of meaning, organizational culture</td>
</tr>
</tbody>
</table>

The three types of knowledge discussed in Tsoukas (1996) could be considered different types of individual knowledge with mostly tacit characteristics: *role-related normative expectations* may be the easiest to transfer and change, whereas *individual disposition* due to past socialization as well as *local knowledge of particular circumstances of time and place* are the most challenging. It is a question not only of how but also of what knowledge is considered valuable, and of the relative standing of knowledge possessed by the acquiring as well as the acquired firm. Given the results of their study on retaining human capital in acquisitions of high-tech firms, Ranft & Lord (2000), emphasize relative standing, in other words the extent to which the acquirer values the skills and capabilities of the acquired firm's key personnel.

Furthermore, professional or knowledge-intensive service firms may possess *technical and client knowledge*, which they use to create technology-based customer solutions. This knowledge may exist on the sectorial, organizational and individual level. Firm-specific and organizational knowledge relates to products, services and processes developed and/or used by the firm and disseminated either through formalized systems or socialization (Empson, 2001). Client knowledge, in turn, includes knowledge of the particular industry, the specific client firm and the client’s key employees.

Bresman et al. (1999) discuss elapsed time, as well as communication, visits and meetings as factors facilitating the transfer of technological knowhow and the normative integration of companies. In other words, the transfer of this type of knowledge requires patterns of human-to-human communication in order to create a supportive environment or social community (Kogut & Zander, 1992). This naturally poses a challenge when the parties do not share a common location or space. Bresman et al. (1999) found that, in the context of acquisitions, the relationship between the parties is rapidly evolving:
knowledge transfer is initiated in a hierarchical manner but develops later into a more reciprocal process. This transformation into a more reciprocal relationship resulted in the transfer of more tacit forms of knowledge.

In the context of service-firm acquisitions, Empson (2001) found that employees of professional firms resisted knowledge transfer if they perceived that the merging firms differed significantly in terms of the quality of their external image and the form of their knowledge base. Key individuals may not only lack absorptive capacity and motivation, as Szulanski (1996) argues, but may also experience “a fundamental anxiety about their sense of self worth” (Empson 2001, p. 857). Empson (2001) also argues in her study of mergers in professional services that individuals with a predominantly tacit knowledge base place less value on the codified knowledge of their new colleagues, and vice versa.

Furthermore, as Argote & Ingram (2000) note, interactions between people represent the most difficult types of knowledge to transfer, yet interpersonal interaction is at the heart of socially constructed organizational knowledge (Kogut & Zander, 1992), and a source of value creation in most knowledge-intensive service businesses. In parallel with post-acquisition integration and related knowledge transfer, both the acquiring and the acquired service firm should be able to maintain the quality of their customer service, which requires most of the existing human resources and makes the smooth alignment of organizational knowledge processes both a necessity and a challenge. We believe that the current study contributes to filing a significant research gap in identifying the critical factors related to the transfer of different types of service knowledge in the context of organizational integration. We will now describe the research setting and methods used.

Methodology

The choice of research design was based on the objectives of the study. We took an exploratory perspective and conducted a qualitative case study based on multi-site, multi-phase and multi-source case-based methodology. We first selected a case firm operating in the field of knowledge-intensive business services, which had aimed at significant growth through acquisition in recent years. We then incorporated four different acquisition cases into the study. By comparing findings from the individual cases we were able to assess whether an emergent finding was idiosyncratic to a single case, or consistent within a number of them (Eisenhardt & Graebner, 2007; Yin, 2003). Hence the
multi-acquisition perspective allowed us to identify the critical factors related to the transfer of service-critical knowledge between the two organizations, the acquirer and the acquired.

We used theme and focus-group interviews (e.g., Morgan, 1996) as data-collection methods. The theme interviews focused on the role and types of knowledge, and the means of transferring it to the merged companies, whereas the emphasis in the focus-group interviews was on the types of knowledge, the means of transferring it, the critical or important factors related to the transfer process, and generating ideas for improving these processes. We interviewed 25 people from the acquiring company and the four acquired companies in May-June 2010. The interviews lasted between 70 and 90 minutes each, and produced 152 pages of transcribed data.

The analysis processes covered four consecutive phases, following the procedure presented in Auerbach & Silverstein (2003). Firstly, we carefully read through the interview transcripts in order to identify the relevant descriptions of the types of knowledge transferred. Secondly, we conducted a thematic analysis to find recurrent themes and grouped them in order to establish a typology of the different knowledge types. Thirdly, with a view to easing the identification of the critical factors we applied Szulanski’s (1996) categorization as a point of departure in the coding (the nature, context, source and recipient of the knowledge). We conducted an additional thematic analysis in order to identify recurrent ideas, which we classified accordingly. Finally, we traced the identified critical factors back to the types of knowledge transferred, i.e. linked the findings with the typology established in phase 2.

In order to increase the validity of the research we discussed the key findings together with three company representatives in a three-hour workshop session. The following section gives the results of the analyses.

Results

Critical factors related to the nature of knowledge and the context

The types of knowledge that were transferred to newly acquired companies were related to B2B professional service software (in cases when it differed between the acquirer and the acquired target), the ERP system, ways of organizing (e.g., the team structure), coordination processes (e.g., financial reports and HR processes), service portfolios sold to B2B customers, and customer processes and an organizational culture aiming at efficiency.
and effectiveness. Thus the cases involved the transfer of very diverse types of knowledge, both tacit and explicit, and both external (about clients) and internal (management systems and the organizational culture).

Most importantly, the acquired units faced a fundamental shift from one type of culture to another, which could be labelled knowledge-culture asymmetry. The acquired units were typically small firms with a family-like atmosphere, and the means to transfer knowledge were personalized and more informal in nature. Many interviewees described how the acquired firm approached knowledge-transfer issues in a very different manner – e-mail was used as a focal communication tool, and the amount of information related to the new ways of working was huge in contrast to the rather stable situation before the acquisition. For instance, when we asked the acquired firms’ employees how their daily work had changed, many of them pointed out that the number of face-to-face visits to customers had decreased significantly due to both a lack of time and the changes in preferred communication channels.

Following the changes in the knowledge culture and modes of communication, many interviewees pointed out that they had difficulties adapting themselves to the new ways of sharing knowledge. A focal critical issue here concerned the interpretation and internalization of all the incoming information, which also required both time and genuine effort from the acquirer’s side, and was not only a question of giving information for information’s sake. Similarly, some informants raised the issue of “window-dressing” types of education and training:

“Then we attended the training session... We sat there staring at the screen as he showed us what type of software we would use from now on and how it works. Like a kind of total experience: learn-to-use-IT-systems-by-watching.”

However, some informants also described acquisition cases in which such in-room guidance was effective. This brought significant benefits in terms of adopting and learning the new systems, as knowledge was transferred through means the employees were used to.

“I found it very positive. It was possible to get your own support person to visit your desk, in a given timeslot, if you needed some help in system use, for instance.”

Even if the transfer of knowledge could have been smoother and more effective, with appropriate timing and in-room guidance, its tacit nature remained a significant concern particularly within the customer interface at which its non-imitable characteristics were most evident. This fact also made retaining key employees a focal issue (see also Ranft & Lord, 2000), even if the major motivation for the acquisition was to gain access to new markets.
rather than to new knowledge resources. The tacitness of customer knowledge caused contradictions in the chosen means of knowledge transfer: the acquirer tried to transfer the more systematic and consultative customer-relationship-management practices to the merged units, which dealt with customers in a different manner, drawing on socialization, personal contacts and experience. As one interviewee stated:

“The most difficult part here is what we know about our customers. Because we all have our own, and each of them has its own special features, it is something you just cannot put onto a piece of paper or into a file. Of course we are constantly trying to find out how to solve this problem...if, let’s say, one of us kicks the bucket, what happens then...”

To some extent, the problem of such “hidden” knowledge and the difficulties in transferring it could be solved through the more accurate documentation of workflow and relationship-specific knowledge, as the informants also pointed out. Yet this would have required both parties to engage in a simultaneous work mode and to codify customer knowledge, which was considered difficult or impossible to execute due to the lack of time. The core service required all the effort from the employees’ side. Hence, we conclude by noting the role of time as a critical factor both in transferring tacit knowledge and in matching the different types of knowledge cultures in general.

**Critical factors related to the source and the recipient**

A variety of the critical factors were related to the characteristics of the knowledge source and the recipient. As noted earlier, knowledge transfer in these cases appeared mostly as a one-way flow from the acquirer to the acquired units, in other words it was asymmetric in nature. This could have been due the fact that the acquirer was a larger company and the acquired units were rather small. Consequently, the acquirer aimed at business growth rather than at gaining access to new knowledge and expertise, for example. This setting provided both an opportunity and a challenge in terms of knowledge transfer. On the one hand, the acquirer had a lot of experience of similar types of acquisitions, and was able to initiate the transfer processes related to explicit knowledge in an efficient manner. On the other hand, there was a danger that the acquirer was only prepared to carry out routine types of knowledge transfer at the expense of being able to find ad-hoc solutions that took the context into account (see also Szulanski, 1996), and that no systems to evaluate employees’ prior expertise and competence would be implemented.

Indeed, knowledge transfer did not appear to be reciprocal (Bresman et
al., 1999). It was rather primarily about laying the ground for the change to take place – in other words, passing the mental “waiting room” stage in the acquired firms – and thereafter pushing knowledge in. As many of the interviewees in the case organizations pointed out, process-related knowledge about the new ways of working could be transferred smoothly when the people were ready to absorb it. Above all, this required creating as safe an atmosphere as possible, so that resistance to change would not hamper the employees’ willingness and ability to absorb new knowledge. It seemed that the greater the asymmetry between the organizational knowledge cultures and the “ways of the house”, the greater was the resistance to change and the more the employees were stuck in their existing organizational identities:

“Earlier we were able to do just like we wanted...and naturally, going against certain authorities was significant here.”

Acquisitions also represented a major organizational change in terms of the IT systems used, which caused many of the interviewees within the acquired companies to express concern about their own ability to carry out their daily work.

“At the very beginning we would have needed someone to give us hand-to-hand guidance, in a two-week session, for example. Because I felt like ‘help, I’ve been doing this work for 30 years and now I can’t even hold the pencil the right way round’.”

This problem appeared to result from the professional-skills requirements: the employees manifested themselves as self-critical, careful and analytical people with high standards regarding their own competence. At the same time, they were highly motivated for the acquisition to take place, as they saw it as an opportunity to develop their own expertise and become part of a reputable and large professional firm of which they could be proud. The image of the acquirer was thus highlighted, representing a highly motivating factor, but on the other hand the employees also experienced some kind of performance anxiety.

Limits to the absorptive and retentive capacity of the merged units also came up in the interviews. Although the employees were highly skilled and experienced, thus considering the absorption of objectified professional knowledge rather easy, they had severe problems in interpreting the underlying meanings – the source being a firm with very different practices of transferring knowledge, specifically documentation-types of knowledge, for instance. In some units the employees expressed concern about why the acquiring firm had to “…communicate everything in such a complex manner so that no one can understand the content”. Related to this, a point that frequently came up,
which was related to easing the interpretation of knowledge, was to split it into coherent and systematic pieces rather than trying to push in too much information at one time. This was particularly the case with e-mail-based information sharing. For instance, one of the interviewees would have needed a “big picture” first in order to be able to better absorb the details.

Further, appropriate timing and structuring information were seen as critical issues in the adoption of new IT systems. The problems were not related to the source’s motivation – on the contrary, some interviewees thought that the source was over-motivated. In other words, there was a tendency to engage in rushing-types of knowledge-transfer behaviour, with tight schedules and in pursuit of rapid growth. This did not allow the recipients much time to interpret the knowledge, as noted above.

“If I think about it afterwards... It would have been better if we had first implemented the systems and learned how to use them, and the official acquisition would have taken place thereafter.”

Given that interpretation was considered a critical factor, many interviewees highlighted the focal role of unit managers. As a supportive and trusted party, their role was to localize knowledge in order to facilitate its use in the local settings, and to help employees to interpret knowledge related to the use of professional systems, for instance. It was a question of bringing the source and the recipient of the knowledge closer to each other, thereby facilitating relationships that provided a means of transfer:

“Of course it is my role to guide employees and to give practical advice. Kind of I should be the one who understands [the systems] and is able to inform others about it.”

“It is important that we have someone here to tell us what we need to do. So that we don’t need to search for every single piece of information ourselves, but someone concretely sits here with us and shows us how to get started.”

Finally, with regard to the transfer of the most complex types of knowledge – organizational practices and culture – our informants highlighted the importance of building trust between the source and the recipient. The development of trust was facilitated through engaging in open communication with the acquired units, listening to them, and showing concern and empathy. Unit managers had an important position in building trust between the source and the recipient, but it was considered essential for the representatives of the acquiring firm also to be present from the very beginning. Many interviewees appreciated these key persons for proactively encouraging and facilitating discussions, as the acquired companies’ employees did not engage in such behaviours by nature.
“The employees expressed their fears and distress to the HR manager, who passed on the information and the issues were openly discussed. The situation eased after that and knowledge transfer became much easier; all the employees were more receptive.”

“It is important how you make the first contact... We go there, sit around the same table and start building up cooperative practices. I tell people we are operating in the same field, doing the same things, but of course there are also changes taking place.”

Reflecting the knowledge typology (Spender, 1996) presented in section 2, Table 2 below summarizes the critical factors discussed, linking them to the types of knowledge transferred in the case organizations.

Table 2: Types of knowledge and the related critical factors in knowledge transfer

<table>
<thead>
<tr>
<th>Type of knowledge</th>
<th>Critical factors</th>
</tr>
</thead>
</table>
| Conscious: professional knowledge held by individual employees, e.g., taxation law, customer information | Lack of time (-)  
Motivation (+) |
| Objectified: process documentation, coordination, databases, systems, e.g., the intranet, ERP, CRM, B2B service software, HR practices, incentive systems, financial reports | Appropriate timing (+)  
Knowledge culture (-/+ depending on the level of asymmetry)  
Absorptive capacity (+)  
Retentive capacity (+) |
| Automatic and preconscious: individual perceptions, values, skills, e.g., using the B2B service software, customer-relationship-specific knowledge | Appropriate timing (+)  
Lack of time (-)  
Motivation (+)  
Structuring knowledge (+)  
In-room guidance and support (+)  
Valuing employees (+)  
Easing interpretation (+) |
| Collective and contextual, e.g., organizational culture and identity, modes of organizing, CRM model and customer processes | Appropriate timing (+)  
Knowledge culture (-/+ depending on the level of asymmetry)  
Identifying employee competences (+)  
Appropriate levels of socialization (+)  
Building trust (+)  
Creating a safe atmosphere (+)  
Absorptive capacity (+)  
Retentive capacity (+) |
Here we again note the ease of transferring conscious individual-level knowledge in contrast to other types of knowledge, as also suggested in prior research (Spender, 1996; Szulanski, 1996). Whereas in the former case there is typically enough time to engage in the transfer, as well as the motivation to share, whereas the latter types of knowledge constitute a more complex variety of critical factors. According to our findings, the asymmetry between knowledge cultures may represent the biggest challenge. In the following we discuss the findings in the light of the relevant literature.

Discussion

This study investigated the critical factors involved in transferring service-business knowledge in the context of acquisitions. The results go back to the fundamental issue of unravelling the types of knowledge being transferred and considering the means by which to transfer it (Jasimuddin, 2007). As Empson (2001) notes, it is essential to understand the differences between the knowledge bases of merging firms, including the types of knowledge they value (codified or personalized) and the types of mechanisms used to transfer the knowledge. The need first to identify the knowledge cultures and the applied strategies is the fundamental lesson to be learned from the current study.

Secondly, the acquirer must be aware of the recipients’ current competences and capacity to absorb new knowledge. Mapping the competences in the acquired companies beforehand, for example, would facilitate this process. Across the cases there were concerns that the acquirer over-relied on the ability of the units to carry out their tasks under conditions of change, and to put internalized knowledge to use. The employees would have needed more time, and concrete, practical guidance. Again, this asymmetry reflects the different knowledge cultures. Empson (2001) also points out how employees who used to rely on tacit types of knowledge did not value the codified knowledge base of their new colleagues, and vice versa.

The theory of relative standing (Frank, 1986) concerns “the importance of an individual’s feelings of status and worth relative to that of others in a proximate social setting” (Ranft & Lord, 2000, p. 300). In order to avoid knowledge-transfer bottlenecks, the acquiring firm should find a way to create a safe atmosphere (organizational level) and demonstrate to employees from the very beginning that their expertise is valued and appreciated (individual level). The firm should therefore be clear about its motivation for the acquisition, and about the type of knowledge it values in the acquired firm currently and in
the future (see also Ranft & Lord, 2000), and should plan and implement the knowledge transfer accordingly.

Interestingly, our empirical data did not highlight the often-emphasized role of motivation in knowledge transfer (Osterloh & Frey, 2000) – it was rather identified as a starting point for the acquisition and transfer processes. More emphasis was put on the recipient’s ability to absorb and internalize the knowledge (organizational level) and interpret it (individual level), on the lack of time as a negative factor, and on appropriate timing as a positive factor. We suspect that the role of motivation may thus be more salient when it is absent, rather than when it is present. Szulanski (1996) also points out how a lack of absorptive capacity and problems in the relationships between the source and the recipient dominate motivation-related barriers to knowledge transfer.

The notion that the transfer of tacit knowledge requires personal interaction is well established in the literature (Davenport & Prusak, 1998; Nonaka and Takeuchi, 1995). However, an interesting finding in our study was the acquiring firm’s striving towards transferring tacit knowledge by codified means, instead of trying out informal means, which require time and space. One prevailing example concerned the customer processes and the whole model of customer-relationship management: a rather formalized approach to knowledge transfer was taken as opposed to a more socialization-based approach (Empson, 2001). We could label this information-management bias. Although the actual reasons for such bias remain beyond the scope of this paper, this finding carries some important implications. Firstly, it is necessary to identify the nature of the knowledge that needs to be transferred to the acquired companies, and to align the communication patterns accordingly (see also Kasten, 2009). Secondly, the acquirer needs to take the critical issue of timing into account by splitting the knowledge into organized and systematic pieces, while also allowing enough time for interpretation and institutionalization. It is essential to avoid unrealistic expectations of “window-dressing” type of knowledge transfer. Tacit transfer takes time.

In a similar vein, Guzman (2008) points out that learning-by-observing is limited in the case of complex knowledge, such as that required to provide professional services, as the employees also need to explain the logic of the set of tasks. Much of the tacit knowledge and related experiences is shared only through collaborative working and the development of informal social relationships (Nonaka & Takeuchi, 1995): this is a fundamental lesson concerning the transfer of service-business knowledge in particular.
Conclusions

The current study focuses on an important issue, namely the inter-organizational transfer of service-related knowledge in acquisitions. Although knowledge-transfer issues in general have long been on the academic agenda and under much debate, the same cannot be stated about services, and particularly about the challenging issue of transferring human-bound tacit knowledge and shared practices among service organizations in order to create more value for customers. Our case analysis represented both successful and unsuccessful acquisition cases, thus by comparing them we were able to distinguish the most salient critical factors behind successful knowledge transfer.

From the practitioners’ perspective, our study focuses managerial attention on understanding the “soft types” of critical factors such as valuing employees, easing interpretation, identifying employee competences, building trust, creating a safe atmosphere and diagnosing knowledge cultures, thereby avoiding information-management bias. Its contribution to the literature on knowledge transfer is to complement Szulanski’s (1996) categorization of critical factors. Secondly, we built a typology linking the identified critical factors with the type of knowledge being transferred. Thirdly, the findings contribute to KIBS research in enhancing understanding of the mechanisms and conditions through which different types of professional service knowledge may be successfully transferred.

Further research should focus more intensively on the critical issue of analysing and matching different knowledge cultures within service firms. The identified critical factors should also be positioned along a timeline covering the stages of organizational integration. The research design of the current study did not allow us to identify a detailed timeline (e.g., the initiation, implementation, ramp-up and integration stages of knowledge transfer, as Szulanski, 1996 suggests).

Finally, we note that the results cannot be generalised to other service industries as they focus on a single type of knowledge-intensive service. This could be considered a limitation of the study, and similar exploratory studies could be conducted in a variety of service industries for the purpose of validation. However, the results give some new insights related to knowledge transfer in service business acquisitions.
References


University Knowledge Transfer in Romania: Getting Ready for the U-Multi-rank

The aim of this study is to trace Romanian universities’ performances in knowledge transfer on the set of indicators advanced by the U-Multi - rank, the new performance – based ranking of European universities, whose first results are expected in 2013. The conclusion is that further developments in knowledge transfer in Romania will be highly influenced by the governmental agenda and its alignment to the European recommendations for IP management and knowledge transfer.

Keywords: knowledge transfer, U-Multi - rank, Romanian universities, IP and knowledge transfer recommendations, Code of Practice.

Introduction

At the European level, the importance of knowledge transfer between public research organizations, including universities and industry has been increasingly recognised and emphasised. As a result, several policy initiatives and support measures have been advanced at the European level in order to encourage Intellectual Property (IP) management and knowledge transfer. Among them, the U-Multi - rank – the new performance-based ranking system of European universities – is the most recent one and is expected to both encourage higher education institutions to stimulate the transfer of their research results and to clearly make the difference between top performers and universities lagging behind.

Given the increased attention paid to universities’ knowledge transfer at the European level, but also the international relevance of the new
ranking system, our study aims to trace Romanian universities’ performances on knowledge transfer on the set of indicators advanced by the U-Multi - rank. On the one hand, we make first some inferences into the structure of universities’ third party funding, under the assumption of a very low business-funded R&D in higher education (Organisation for Economic Co-operation and Development, 2011). On the other hand, under Ranga’s assumption (2011) that Romanian universities’ third mission (including knowledge transfer) is in a very incipient stage – we try to benchmark some performances for different outputs (patent applications, co-publications, spin-offs etc.) and to compare them to those of other European countries.

The rationale of this study is thus induced by the emphasis put on this topic at the European level and by the belief that benchmarking exercises are always useful in policy-making at national and institutional level. In order to meet our research aim, we first introduce European Union’s (EU) approach to IP management and knowledge transfer (Section 1) and then present the research method (Section 2), research results (Section 3), conclusions and policy implications.

The EU approach to IP management and knowledge transfer

In order to address the 3% of Gross Domestic Product (GDP) objective for research and development (R&D) investment, the European Commission agreed to apply the open method of coordination for policies related to investment in research. As a result, in 2007, the EU Commission Communication on “Improving knowledge transfer between research institutions and industry across Europe: embracing open innovation – Implementing the Lisbon agenda” has set a number of approaches for a common European framework for knowledge transfer. In terms of this communication, knowledge transfer is conceptualized as the process for capturing, collecting and sharing explicit and tacit knowledge, including skills and competence; it includes both commercial and non-commercial activities such as research collaboration, consultancy, licensing, spin-off creation, researcher mobility, publications etc., (European Commission, 2007). At the same time, the Communication is accompanied by a staff working document on “Voluntary guidelines for universities and other research institutions to improve their links with industry across Europe” that is aimed at helping research institutions to develop more effective mechanisms and policies to promote both the dissemination and the use of publicly – funded R&D results (Commission of the European Communities, 2007). Following
the 2007 Commission Communication, a set of Recommendations on the management of Intellectual Property (IP) and knowledge transfer activities was developed in 2008 (Commission of the European Communities, 2008), in order to provide Member States and their regions with policy guidelines for the development or updating of national frameworks. Simultaneously, a Code of Practice for universities and other public research organizations was issued to set principles for internal IP, knowledge transfer and collaborative and contract research.

To review and report on initiatives taken at the national level to implement Commission’s Recommendations and the Code of Practice, but also to identify a set of common indicators for measuring progress, the Committee for Scientific and Technical Research (CREST) set up a dedicated Working Group consisting of 33 representatives of Member States and Associated countries. As a result, in 2010, the Working Group assessed the current state of the play and found that the majority of countries had disseminated the IP Recommendations and had taken steps to actively engage stakeholders in various activities such as national debates, dedicated workshops and seminars. Additionally, several countries had used the Recommendations while drafting amendments in national legislation or had integrated the policy measures into broader national knowledge transfer schemes (ERAC Working Group on Knowledge Transfer, 2010).

The Europe 2020 strategy, particularly through its flagship initiative Innovation Union, reiterates the commitment to promote open access to R&D funded results, facilitate effective research and knowledge transfer, develop a European knowledge market and examine the role of competition policy in safeguarding against use of IP rights for anti-competitive purposes (European Commission, 2010). Moreover, linking higher education institutions (HEIs), research and business for excellence and regional development is a key issue in the new agenda for the modernisation of Europe’s Higher Education system. Member States and higher education institutions are expected to stimulate the development of entrepreneurial, creative and innovative skills in all disciplines, strengthen the knowledge transfer infrastructure, encourage partnerships and cooperation with business as a core activity through reward structures, incentives for multi-disciplinary and cross-disciplinary cooperation and to promote the systematic involvement in the development of integrated local and regional development plans (European Commission, 2011a).

To improve the possibility for individual public research organizations and Member States to monitor and compare their achievements in knowledge
transfer, CREST/ERAC Working Group on Knowledge Transfer has established a sub-group dedicated to defining a set of common indicators. Thus, the EC’s Expert Group on Knowledge Transfer Indicators has elaborated a proposal for a composite indicator describing three different dimensions of knowledge transfer: through trained people (the mobility of educated or trained in or by the research sector), through institutional co-operation in R&D and through IP transfer, mostly the commercialization of research results. For the fourth proposed dimension – network activities that enable and facilitate knowledge transfer – indicators did not seem feasible for the moment (Finne et al., 2011).

Finally, all the efforts to promote knowledge transfer at the EU level are also reflected in the new classification and ranking exercises of European universities, whose first results are expected in 2013 (Europan Commission, 2011b). In this context, U-Multi-rank is a new performance-based ranking and information tool that would enable users to profile institutions across five dimensions: teaching and learning, research, knowledge transfer, international orientation and regional engagement, each of them described by a number of different other indicators (van Vught and Ziegele, 2011). Given this context, the aim of this study is to trace Romania’s universities’ performances in knowledge transfer on the proposed U-Multi-rank indicators, while simultaneously advancing some international comparisons and policy implications.

Research method

In the U-Multi-rank, knowledge transfer is defined in the terms of Holi et al. (2008) as “the process by which the knowledge, expertise and intellectually linked assets of HEIs are constructively applied beyond Higher Education for the wider benefit of the economy and society, through two-way engagement with business, the public sector, cultural and community partners” (apud van Vught, Ziegele, 2011, p. 65). The eight indicators describing the knowledge transfer dimension and validated by the U-Multi-rank pilot study are the following: third party funding; university-industry joint publications; patents; size of the Technology/Knowledge Transfer Office (KTO); continuous professional development (CPD); co-patents; number of spin-offs and incentives for knowledge exchange. To trace Romania’s universities’ performances on the proposed indicators, our study uses a set of universities’ self-reported data that were made publicly available by the Romanian Ministry of Education, Research, Youth and Sports in 2011, following the first National Assessment Exercise for the Classification and Ranking of
Romanian universities and study programs (UEFISCDI, 2011). In total, there were 90 universities that have been subjected to evaluation and considered for this study, of which 56 are public accredited universities and 34 are private universities. As in the HEIs self reported data there is no entry for university–industry joint publications, co-patents and incentives for knowledge exchange, additional evidence will also be brought in from international sources, such as OECD’s and EUROSTAT’s databases.

Research results

Third party funding

Third party funding is defined as “the amount of income for cooperative projects that are parts of public programs (e.g. EC Framework programs) plus direct industry income as a proportion of total income” (van Vught and Ziegele, 2011, p. 68). Table 1 introduces all the R&D income sources for Romanian universities in their average values as % of total income, plus the standard deviations. It should be noted here the fact that the access to public R&D resources in Romania is only offered on a competition basis, so that the amount of public funds allocated to R&D can also be considered a proxy for the capacity to attract R&D resources.

Table 1: R&D income sources expressed as percentage in total HEIs income in 2010 (source: UEFISCDI, 2011)

<table>
<thead>
<tr>
<th>R&amp;D source</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public funds from Romania</td>
<td>3.3313</td>
<td>4.51731</td>
</tr>
<tr>
<td>Structural funds</td>
<td>10.6183</td>
<td>18.05899</td>
</tr>
<tr>
<td>Private funds from Romania</td>
<td>0.3486</td>
<td>1.12119</td>
</tr>
<tr>
<td>Framework Programme 7</td>
<td>0.3873</td>
<td>0.82815</td>
</tr>
<tr>
<td>Other EU programs</td>
<td>0.4998</td>
<td>1.47584</td>
</tr>
<tr>
<td>Public funds from abroad</td>
<td>0.2344</td>
<td>0.80244</td>
</tr>
<tr>
<td>Private funds from abroad</td>
<td>0.1452</td>
<td>0.60177</td>
</tr>
<tr>
<td>Contract research income*not obtained through competitions</td>
<td>0.9811</td>
<td>2.59526</td>
</tr>
<tr>
<td>Commercial income</td>
<td>2.0679</td>
<td>4.71540</td>
</tr>
</tbody>
</table>

In 2010, structural funds were by far the most important source of
external income for Romanian universities that went on average up to 10.6% of HEIs total income, despite a high standard deviation. Public funds distributed according to the Romanian National Plan for R&D and commercial income came second and third, whiles all the other funding sources went below the 1% in share in universities’ total income. When considering the type of the funding source, private funds (from Romanian competitions, from abroad and from contract research) are well behind the public ones; moreover, the funds attracted from abroad (Framework Programme 7, EU programs, public and private funds) are incomparably lower than those attracted from domestic sources.

Other knowledge transfer indicators

According to the U-Multi - rank, the number of patent applications for which the university acts as an applicant, the number of employees in the KTOs, the number of CPD courses and the number of spin-offs created over the last three years should all be reported relative to the FTE academic staff, in order to reduce the bias created by size differences. The Table 2 summarizes the average values for these indicators and points out the maximum values for each of them. It should be noted that patent applications at the Romanian Patent Office (OSIM) and at the European Patent Office (EPO) are reported separately, together with the results that refer to the number of new products and services offered to the market.

Table 2: Knowledge transfer indicators per full-time equivalent (FTE) academic staff in 2010

<table>
<thead>
<tr>
<th>Knowledge Transfer Indicator</th>
<th>Maximum</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patent applications at the Romanian Patent Office (OSIM)</td>
<td>0.08</td>
<td>0.0064</td>
<td>0.01356</td>
</tr>
<tr>
<td>Patent applications at the European Patent Office (EPO)</td>
<td>0.01</td>
<td>0.0002</td>
<td>0.00070</td>
</tr>
<tr>
<td>New products and services</td>
<td>1.07</td>
<td>0.0287</td>
<td>0.11720</td>
</tr>
<tr>
<td>CPD courses</td>
<td>0.42</td>
<td>0.0395</td>
<td>0.06919</td>
</tr>
<tr>
<td>Spin offs (2008 - 2010)</td>
<td>0.04</td>
<td>0.0021</td>
<td>0.00736</td>
</tr>
<tr>
<td>KTO staff</td>
<td>0.25</td>
<td>0.0232</td>
<td>0.03667</td>
</tr>
</tbody>
</table>

(Source: UEFISCDI, 2011)
The reduced number of R&D outputs per FTE academic staff can be explained by the fact that only one third of the HEIs reported patent applications at the Romanian Patent Office and the introduction of new products and services and only six universities applied for a patent at the European Patent Office in 2010. Similarly, only 14 HEIs reported the creation of at least one spin-off in the last three years. As regarding the number of CPD courses offered, it is on a clear ascending trend and is significantly correlated with the income received from structural funds. The same happens to the number of KTO staff: 55 universities have already employed dedicated staff for knowledge transfer, while almost all of them use to engage teaching staff with such a role.

**International comparisons**

In addition to the HEIs self reported data there are a number of international statistics and surveys that allow comparisons on the proposed indicators.

According to the Organisation for Economic Co-operation and Development (OECD), **business-funded R&D in the higher education** (HERD) in the form of grants, donations and contracts is defined as “the domestic business enterprise sector’s contribution to intramural R&D expenditures in higher education” (Organisation for Economic Co-operation and Development, 2011, p. 90) and can serve as a proxy for contractual agreements. With only 3.8% of the HERD being financed by industry, Romania is well below the EU27 average (6.38%), but is better positioned as compared to other Eastern European Countries (e.g. the Czech Republic, Poland, Slovakia) or to other innovation leaders such as Italy or France. For this indicator, Hungary, Germany, Belgium, the Netherlands, Slovenia and Spain can be benchmarked as the best practice cases (Fig. 1).

![Figure 1: The percentage of Higher Education R&D Expenditure financed by industry in 2009 (source: OECD, 2011)](image-url)
At the EU level, the *Innovation Union Scoreboard* (PRO INNO Europe, 2011) captures data on the **public – private co-publications per million population**, which allows some pertinent comparisons between the EU countries, despite the fact that the data do not exclusively refer to the HEIs, but to all public research organizations. As evidenced by the Fig. 2, there are large differences in co-publication patterns between the EU27 countries, with more than 100 co-publications for Denmark, Finland and Sweden and less than five co-publications in Bulgaria, Latvia, Lithuania, Malta and Poland. On average, 36 co-publications are observed for the EU27, but if we exclude the top three performers, the average decreases to less than 25. Romania stays at the end of the European ranking, with 6.3 co-publications per million population.

![Figure 2: Public – private co-publications per million population in 2008](Source: PRO INNO Europe, 2011)

Fig. 3 presents the EU27 countries’ EPO patent applications by HEIs in 2005. The patents applied by for the HEIs represent a very small share of the total number of EPO patents in the EU7 (1.8%), with Baltic countries - Estonia, Latvia and Lithuania – being the top performers. For this indicator, Romania belongs to that group of countries whose applications by the HEIs is less than 1% of the total number of EPO patent applications.

![Figure 3: EPO patent applications by the HEIs as % in 2005](Source: Eurostat 2010)
Some other interesting insights are offered by The Proton Europe Annual Survey of Knowledge Transfer Offices (Piccaluga et al., 2011), but the results are not normalized by the full-time equivalent staff, so the comparisons could be affected by size differences. Similarly, the European Knowledge Transfer Indicators Survey (EKTIS) of 430 European universities and research institutes give standardized performance measures for 2010 per 1000 research personnel (Arundel et al., 2012). In line with EKTIS’ results, in 2010, European universities produced on average 8.4 patent applications per 1000 research staff (0.008 per research staff) and established 2.2 start-ups per 1000 research staff (0.002 per research staff). By comparison, Romanian universities produced on average 0.006 patent applications per FTE staff at the Romanian Patent Office, 0.002 patent applications per FTE staff at the European Patent Office and established 0.002 start-ups per FTE staff in the last three years (2008 - 2010). At the European level, license income is highly concentrated, with the top 10% of universities accounting for 86.9% of all license income. Not at least, the European KTOs at universities are, on average, 14 years old and had 12 FTE staff members. By comparison, in Romania, only few universities have consolidated their technology transfer and commercial infrastructure and staff, mostly in leading academic centres in Bucharest, Cluj, Timisoara, Iasi, Brasov etc. (Ranga, 2012).

Finally, the Code of Practice Survey aimed at evaluating the principles and practices of IP management and knowledge transfer used by European universities and research institutions give some insights over the types of incentives for research staff to protect their IP and disclose inventions with commercial potential. Thus, by far the most common incentive among the surveyed organizations is to offer the inventors a percentage of future revenue (84%), while other incentives are used less frequently: awards, publicity, internal and external recognition (47%), and additional funds for R&D (35%), lump sum payments such as an inventor’s bonus (31%) or impact on promotion and career decision (23%) (Arundel et al., 2012). As regarding Romania, universities are rewarded through participation in royalties, while the incentives for individual researchers refer to financial incentives, but also to the (indirect) effects on reputation and career advancement (Strenc, Popescu, 2011).

Conclusions

This paper has traced Romanian universities’ performances in
knowledge transfer on the set of indicators advanced by U-Multi - rank and available from HEIs self reported data, international statistics databases and surveys. Although there is still much room for discussion to harmonize the reporting procedures – in order to make the data comparable -, our study has drawn a one snapshot profile that leads to some conclusion and policy implications.

First of all, the high funding flows from structural funds – more than 57% in the total third party budget – will undoubtedly bring improvements in HEIs’ R&D capacity; however, there is a clear risk of an increasing dependency on these types of funds and any change in targets would affect the long-term agenda. On the contrary, attracting funds from industry is highly advised, both because it reduces the dependency on public funding and because it turns the R&D results into real innovations. Unfortunately, for the moment, less than 5% of the HERD is financed by industry (as compared to 6.38 at the EU27 level) and this topic should be addressed at national and institutional level.

Second, as regarding the output-type indicators (patent applications, spin-offs, co-publications), but also the commercial income generated through their exploitation, Romanian universities’ performances are much lower as compared to other countries. In addition, the support (infra) structure for knowledge transfer in universities is in its only incipient stage.

Further developments in knowledge transfer in Romania will be highly influenced by the governmental agenda and by its alignment to the European recommendations for IP management and knowledge transfer. For the moment, Romania does not require by law that universities cooperate with the private sector in order to improve knowledge circulation, such as in the case of France, the Czech Republic, Denmark, the Netherlands, Belgium, Germany etc., but addresses knowledge transfer to more non legal approaches such as steering dialogues, schemes and national programs. Similarly, Romania does not offer incentives to structural anchor knowledge transfer, but offers incentives to cooperate and network (ERAC Working Group on Knowledge Transfer, 2010). For the future, Romania plans to harmonize the existing practices with the Commission Code in national guidelines and legislation and these changes are expected to improve current performances in knowledge transfer.

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Innovative Models of Increasing Competition and Competitiveness in Science

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Technology transfer involves a series of relationships, formal and informal type among research units - economic development and public and private sectors. The purpose of the transfer is to strengthen the economy in a territory, by accelerating the application of new technologies and resources needs and opportunities for private and public sectors.

Keywords: innovative models, increasing competition and competitiveness, science

Definitions and general mechanisms for technology transfer

Technology transfer involves a series of relationships, formal and informal type among research units - economic development and public and private sectors. The purpose of the transfer is to strengthen the economy in a territory, by accelerating the application of new technologies and resources needs and opportunities for private and public sectors.

Technology transfer is the process by which knowledge, facilities or capabilities of existing publicly funded research and development, are used to meet the needs of public and private [8].

In principle, the results of successful technology transfer efforts, can show improvement products, efficient services, improve manufacturing processes, the development of new products for disposing of domestic and international markets. In essence, the technology transfer process involves three entities (Fig. 1.), Which were in a relationship of cooperation.
Figure 1: The process of technology transfer

These entities participate, depending on each specific activity, technological change, one that involves:

• developing the basic concept (technological creativity).
• economically relevant experimentation on products and processes.
• Basic knowledge diffusion and their application.

Thus, technology transfer is seen in the most general sense, the transfer of research results in research and development units (universities, research institutes), in business firms or other parts of society [9]. The three entities involved in transfer of technology aimed at accelerating economic use of research results involving the transition from invention to innovation and dissemination of success on the market, creating added value.

Internationally, there is developing a wide network of organizations promoting competitiveness and technology transfer. These organizations have set up systems that interface between research establishments and industrial companies. The best-known international organization of technology transfer, noted:

• Federal Laboratory Consortium for Technology (FLC), Washington, USA.
• Association of University Technology Managers (Autm), Norwalk, USA.
• Competitive Technologies Inc. (CTI), Fairfield, USA.
• British Technology Group (BTG), London, England.
• Technology Transfer Defense Evaluation Research Agency (DERA), Kenilworth, England.
• Institute for Industrial Technology Transfer (Iittala), Champs sur Marne, France.
• Center for Innovative Technology Transfer Bayern, Nurnberg, Germany.

In the past 15 years have been established in the U.S. and Western Europe becoming more such organizations. Thus, the U.S. technology transfer organizations number increased from 100 in 1983 to 400 in 1991. In Germany, between 1983-1988, 70 organizations were set up technology transfer, and in
France, the number of such organizations has reached 40. Gradually, after 1989, in the context of transition to market economy, such organizations have emerged in Central and Eastern Europe.

The main functions of these organizations are intermediaries and stimulate technology transfer. By providing facilities and technology services, these organizations seek application of innovation, technology transfer and quality management to increase business competitiveness, and providing advice and assistance to research and development organizations to adapt to new demands of globalization.

The specific objectives of technology transfer activities of organizations are:

**a) Supporting the industrial enterprises to:**
- Application of new technologies and modernizing existing ones;
- Improving the potential for cooperation with international partners;
- To attract grants and repayable, including risk capital funds;
- Improvement of quality management.

**b) Support research and development organizations that:**
- Be able to transfer the research results in economics;
- Can cooperate and assist businesses to implement new technologies and modernizing existing ones;
- Easier to adapt to globalization.

**c) Supporting the national, regional and international, by:**
- Conducting studies and research on science policy and strategy development;
- Attracting new participants in public programs, better information related to them;
- Attracting new sources of co-financing programs.

**d) Raising awareness and awareness on the concepts of innovation, quality and technology transfer by:**
- Developing and implementing educational programs on the concepts of innovation, quality and technology transfer;
- Measures to disseminate information in science, technology, innovation, including by means of information technology;
- Training / training of human resources involved;
- Methodological and logistical support activities for the benefit of doctoral students;
• Attracting young graduates to work specific programs;
• Promotion of the concepts of innovation, quality and technology transfer within firms and the public.

Transfer of technology through direct investment

Research on the international transfer of technology have not developed yet a clear framework within which to carry out a full analysis [7]. Therefore, useful conclusions can be studying the structure of technology transfer through direct investment, made by developed countries to less developed regions. Transfer of technology from Japan to East Asia has evolved gradually, as Japanese firms to outsource production and developed successfully. In a National Institute of Science and Technology Policy of Japan [7] have examined the effects of direct investment in a group of countries comprising South Korea, Taiwan, Hong Kong, Singapore, Thailand and Malaysia. International business development has made technology transfer in a complex and difficult to deal with. Old research on international technology transfer have lost validity. Therefore, the study cited above raises the question of developing measurement methods and appropriate analysis trend towards borderless economy (globalization) and innovative competition. Known product cycle theory (of Raymond Vernon), a theory of technology transfer processes of production in different geographical areas, argues that technological invention occurs in rich countries (where there are high levels of pay) and that technology is transferred, in particularly in countries with low levels of pay, depending on technology maturity. The expansion of multinational companies has triggered a deviation from the product cycle theory, which argued that the fundamentals of production are transferred from developed countries half developed country, and of these, in developing countries, in correspondence with the technology. The speed with which new technologies are running is far greater now than any other earlier stage. Multiplication is found where the right production decisions are based less on technology and on wage levels and more on corporate strategy of manufacturing companies. Globalization of economy is the corporate strategy that induces a hitherto unprecedented scale. Globalization of the economy has gained new dimensions and relevance in the context of the merger as more and more transnational companies. This real economic phenomenon has increased by 50% in 1998 compared to 1997, the number of companies involved doubled compared to 1996 [10]. The phenomenon was much identified May by Martin Carnoy, professor of economics at Stanford University (USA), which showed
that “large multinational companies continue to grow rapidly and to influence changes in the global economy. They also dominated trade between industrial countries and controlling international capital movements “[3].

Transition to the borderless economy has advanced to such an extent that companies have exceeded the product cycle theory and developed what is called the simultaneous structure of global production. This is a process that requires formation of a theory on the relationship between foreign investment and technology transfer [7]. The formation of this new theory, whether technology should be reconsidered, as stated many years ago, that time of transfer of technology should be rethought, since it appears rather as a “euphemism” as long as He refers to “something” that can be sold and, therefore, is a commodity that participate in the economic cycle [6, 2].

Returning to study on technology transfer of Japanese companies [7], it is useful to highlight the methods used. In this study analyzed the major color TV manufacturers and TV cameras, which have located assembly companies in East Asia. Criterion analysis of these producers was the transfer of technology and innovation. First, they examined various major components of the structure of color TVs and TV cameras, in connection with sources of supply. Based on such review, it was estimated that technology was transferred and where. This method clarifies the contextual circumstances of the transfer of technology to the company or between companies. Secondly, it considered the effect caused by technological progress on technology transfer. It was also investigated, innovative process for the manufacture of TV cameras. He made a qualitative analysis of the effect of each technological advance, which appeared in color TV production and TV cameras, an effect which occurred on transfer of technology. Results and conclusions of this study are:

1) For color television, technology transfer from Japan to East Asia has progressed through direct investments of Japanese firms. There is a distinction, the components, the degree of technology transfer. If TV cameras, the progress of technology transfer was slower than for color televisions. In addition, technology transfer can be divided into technology transfer within the company (in company) and technology transfer outside the company (between). From this perspective, the second transfer of technology was practically negligible.

2) Purchase of parts and components are made by major Japanese manufacturers network in the country of origin and in East Asia. This phenomenon is explained by the fact that there are structural limits to technological development, which creates a handicap in developing East Asia
production technology components and their implementation through local production.

3) Technological progress has occurred in parallel with the expansion of outsourced production, the acting on promoting technology transfer.

It was noted that a technology can be incorporated into a parts, components, in a car or a subset of equipment and that it can move. East Asia has adapted well to this movement. Integrated circuits in electronic applications are one example. In this case, leading technology is used in a “black box” and, the effect, today’s technology becomes more difficult to transfer.

The results of this study highlight other issues, more general, which may be subject to analysis. Areas in which Japanese companies operating in East Asia are supplying have diversified. Electronic component manufacturing technology has advanced remarkably. If East Asian countries to better understand technology transfer, which must be analyzed is the end product, but production of major components. On the line this cooperation, Japan and East Asian countries have close economic and technological relations. Also, many countries show a keen interest in Japanese science and technology, requiring technology transfers to raise their technological level. But the perception of technology transfer vary considerably between Japan and East Asian countries. In Japan, in general, thinks that increasing foreign direct investment by the private sector has contributed to developing countries “container”. It is believed that by building factories, hiring local workers, providing education and training, Japanese companies have increased their productivity by investing in countries’ container. Moreover, there attitudes in countries “container”, which expresses the idea that technology transfer is inadequate Japanese firms and that it must transfer higher-tech occupations and jobs for local workers, to the technological lead of countries development. Thus, technology transfer has become a political issue. Such a discussion can take place without a clear understanding of the status of technology transfer. One reason is that the term “technology transfer” is abstract and difficult to understand [7]. Theory “compatible technology” suggests that technology transfer to developing countries to open their technological advances. This theory is based on the idea that these countries face a range of problems in technology assimilation. This theory was inspired by the successive failures to placing factories in developing countries by developed countries, between 1960-1970. Theory “compatible technology” provides the best form of technology that developed countries can transfer to developing countries, is that local technical experts can manage. Interactive relationships between technological, cultural,
institutional innovation and economic development can be studied to find the causes of success in countries that have had the experience of development and technology transfer. Such success stories are the complex socio-technological transformation of developing the U.S., Japan and Sweden and are analyzed in detail, the Ake Anderson, TR Lakshmanan and Wei-Bin Zhang - a group of researchers from the Institute for the Future Study (Sweden) and the Center for Energy and Environmental Studies (USA) [1]. Inspired by the success of countries like USA, Japan and Sweden, many developing countries have tried in the last four decades, modern technology transfer experience. The experience of countries (South Korea, Taiwan, Singapore, etc..), Where there is moderate or high levels of recovery technology and high growth rates, confirming how complex the process of modernization through technology transfer even in conditions in which these countries enjoyed special support. The problems faced by these countries commitment to development through technology transfer experiment were basically the following:

• defining elements of successful development based on technology transfer;
• introduction of technology transfer conditions so as to ensure substantial growth;
• processes that trigger the transfer of technologies and / or change them according to local supply availability, prices and local social context;
• innovations that may arise during technology transfer;
• how the reasons for success and modernization of labor, the entrepreneurs and the general public;
• influence of tradition on the duration, speed and quality of technology transfer.

If East Asian countries, they have rapidly expanded their assembly industries through technology transfer organizations. Also, determine the trend of these countries to develop their own industries through association with firms from Japan and USA. Later, some of these countries has an increased role for the development of their technology, which has contributed to technology transfer organizations, which played an important role in strengthening domestic industries [5].

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