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## The Role of Media Context in the Advertising Persuasion Process: A Modeling Attempt among Children

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*Our understanding remains limited as to how a TV program affects the viewers' reactions toward advertisements surrounding this program. This paper tries to shed light on this research topic, by proposing a global conceptualization of the media context effect on the performance of advertisements targeting young viewers. The paper equally stresses the theoretical as well as empirical contributions of this research.*

**Keywords:** *advertising efficiency, child, context effect, intensity of emotions, polarity of emotions, program appreciation.*

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In normal exposition conditions, TV advertisements are never broadcast alone. They are inserted in a TV programming context, which is, it likely to influence the performance of these advertisements. Many studies conducted among adults and dealing with media context have shown that the TV program surrounding advertisements is a crucial determinant of the efficiency of these advertisements (Soldow and Principe, 1981; Goldberg and Gorn, 1987; Murry et al, 1992; Mathur and Chattapady, 1991). The context effect can be defined as « the effect of the immediate environment in which a stimulus is found, on the perception of this stimulus, its efficiency in raising emotional reactions or any other post exposition measure. Context is, thus, the emotional as well as cognitive reference framework within

which a message is broadcast...” (Poncin, 2003). However, we want to stress the fact that a literature analysis has allowed us to discover that the academic community has particularly been interested in the emotional and evaluating dimension of the program surrounding TV advertisements.

At the beginning, studies dealing with matters of advertising persuasion have focused on the impact of only one response to a program, that is either appreciation (Schumann, 1986), or emotions raised in TV viewers (Goldberg and Gorn, 1987). As a consequence, neither the correlation between these two concepts, nor their joint causal effect on the advertisement could be investigated. Relying on research works in the field of advertising showing that «feeling» and «liking» are two different and distinct constructs (Madden, Allen and Twible, 1988) and that each of them influences the brand’s evaluation separately (Stayman and Aaker, 1988), Murry et al, (1992) were the first to extend those results to research on the effects of context, through examining the simultaneous impact of emotional and evaluative reactions to the program. They have shown that it is the appreciation of the program that best predicts the viewers’ attitude toward the advertisement (Murry et al, 1992, Coulter, 1998).

The child enjoys a privileged relationship with television; He is becoming a TV enthusiast at an ever-younger age (Lurçat, 1995). Nevertheless, there has been no serious investigation that is likely to show the real relationship between the child, advertising and the TV programs surrounding advertisements. Indeed, very few studies dealing with this young market have pondered the effects of the TV programming context on the child’s persuasion process. Those few studies have so far adopted a one-dimensional approach to the media context. Prasad and Smith (1994) as well as Pecheux and Derbaix (2003) have tackled the program according to its emotional dimension. Only one study, that of Pecheux et al, (2006), has investigated the role of the program appreciation dimension in advertising persuasion. On the other hand, no research has studied the joint impact of these two forms of reactions to a program. Thus, it is not easy to anticipate on how they inter-react and affect the performance of advertising messages. Taking into consideration the suggestions of previous works dealing with adults (Murry et al, 1992; Coulter, 1998), our research aims at filling this vacuum, and is set in this perspective. What is more precisely questioned is

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the impact of emotional and evaluating reactions set off by a TV programming context on the advertising persuasion process for a child.

Our objective is to adopt a global approach of the effect of context, by developing and testing a model that involves two qualitative dimensions related to the media context: The audience's attitude toward the program and the audience's emotions while watching this program. Therefore, we propose to explain their simultaneous and relative effects on the advertising responses given by the child, in terms of Aad and Ab. One of the ambitions of this research is to bring to the fore the different processes underlying these effects.

The present work will be organized as follows: We will first present the results related to the impact of emotional reactions raised by a TV program on the advertising performance. Then, we will analyze the role of the appreciation of the programming context in the persuasion process. At the end of the discussion related to each aspect of the research, a hypothesis will be developed. The set of the hypotheses presented will make up our conceptual model. Its discussion will be the object of the last part of this article.

### **Emotional reactions induced by the TV programming context and attitude toward the advertisement**

Some studies conducted in the field of media context have confirmed that TV programs affect the viewers' emotions, which in turn, have an influence on the processing of the advertisements inserted in these programs (Goldberg and Gorn, 1987; Singh and Churchill, 1987; Pavelchak et al, 1988; Mathur and Chattopadaya, 1991). Emotions generated by a TV program are defined as "temporary affective states that are subjectively perceived by an individual". They are, therefore, the set of emotional states felt by viewers during their exposition to the program. According to a review of the literature on adult audiences, the emotional reaction induced by a media context has been measured in two ways, either according to its "intensity" dimension, which reflects the arousal level, or according to its "pleasure" dimension, which reflects the quality or the polarity of this reaction. The latter is the sum of positive emotions (for example joy), or negative ones (such as fear). Only a few research works have examined the

emotional states according to their two fundamental dimensions, i.e., intensity and valency (Nahon and Tassy, 1998; Shapiro et al, 2002; Broach et al, 1995). Yet, distinction between these two dimensions is important since each of them affects the consumer's behavior in a different way (Pavelchak, Antil and Munch, 1988 ; Nahon and Tassi, 1998). The measures of emotions raised by the advertising insertion context, found in studies conducted among children are a little bit different from those used to evaluate adult populations. Hence, Pecheux and Derbaix speak of positive mood versus neutral mood generated by a program. Mood was defined as a "soft" emotional state (Isen, 1984, cited by Pecheux and Derbaix, 2002). As for Prasad and Smith (1994), they mention the degree of violence to measure intense negative emotions versus less intense negative emotions.

Relying on the two-dimensional aspect of emotions and on the way the literature has dealt with the effects of media context in relation with this concept, we will present, separately, the works related to valency and those related to the intensity of emotions raised by the program.

### **Intensity of emotions and attitude toward the advertisement**

It has been demonstrated that advertising could have different levels of efficiency according to the arousal level stimulated in the viewer by the surrounding program (Bryant and Comisky, 1978; Krugman, 1983; Broach et al, 1995; Coulter, 1998). The most common perspective on media context is that involvement in the program or the arousal level raised in the audience, lead to a weakening of the capacity to process advertisements in depth, and thus, to recall scores and attitudes toward the advertisement and the brand , which are of a lower intensity.

A first explanation of this effect is presented by the processing intensity theory. The underlying idea is that a person pays a lot of attention to a stimulus, which causes an intense emotional experience. This makes the decoding and hence the memorization of this stimulus easier (Kroeber-Riel, 1979). Consequently, emotional intensity would weaken the memorization of the stimulus that is not responsible of the emotional experience. By analogy, viewers pay more attention to a TV program that raises more intense emotional reactions. And that being the case, there results a weaker cognitive capacity to process advertisements inserted in this type of

programs, as compared with a program inducing less intense reactions. In fact, the viewer's attention will concentrate on the stimulus that creates the emotional experience, that is, the program, to the detriment of related messages, such as advertisements. Some researchers have confirmed this principle in relation with Aad. Soldow and Principe (1981), have mentioned that advertisements inserted within a program qualified as interesting (a violent detective drama) are not as well-memorized or well-appreciated (perceived as an interruption) as those inserted in "less interesting" programs (a family comedy, devoid of suspense). Such a finding has been stressed by Anand and Sterthal (1992) and by Sanbonmatsu and Kardes (1988).

Steiner (1963) proposes a different interpretation, but one having similar consequences. He states that the interruption of a program by advertisements "bothers" viewers whatever the type of the program viewed, and can affect Aad in an unfavorable way. Besides, it has been suggested that the feeling of irritation caused by the advertisement, "i.e. the level of annoyance with commercials" becomes stronger at advertising cuts corresponding to high arousal levels created by the program. Thus, these negative feelings caused by advertising lead to a negative relation between the intensity of emotions and Aad (Edell and Burke, 1987; Steiner, 1963).

Some research works have led to totally opposite results through supporting the « positive effects thesis », that is, advertisements are more efficient when broadcast within a program that has a rather strong than a weak arousal dimension. The excitation transfer theory proposed by Zillman (1971) has shed light on this result. It shows that when an individual goes through an experience that is emotionally exciting following his exposition to a highly violent TV program, he takes time to readjust physiologically. According to this theory, the intensity of the emotions raised by this program is mistakenly attributed to the advertisements interrupting this program. As a result, the processing of these advertisements will be weakened, and their evaluation improved, provided that the viewer remains "excited" by the program content during his exposition to the advertisement that follows it, but is unaware that the program is the cause of his excitement. This distraction effect goes on for some time, until a cognitive or physiological adjustment (excitation) takes place. These effects on the advertisement appear independently of the

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program's hedonistic tone. They are only reliant on the excitation level raised by the program. Mattes and Cantor (1982) and McGrath and Mahood (2004) have confirmed the predictions of the excitation transfer theory.

Other research works have reached the same conclusions without having referred to this theory. In one of the first and famous studies on this topic, Kennedy (1971) has tested and confirmed that advertising messages are more efficient in terms of attitude toward the advertisement when they are broadcast during a program that raises intense emotions in viewers, than when they are broadcast during one that creates less intense emotions. The outcome of a research conducted by Krugman (1983) on the General Electric Company was the same. The explanation he put forward was that the state of arousal raised by a program will remain during the advertisement, thus, affecting Aad and Ab favorably.

The curvilinear shape of the relation between the intensity of emotions raised by the program and the advertisement's efficiency allows reconciling the contradictory results mentioned above. Tavassoli, Shultz and Fitzsimons (1995) are among the very few researchers who have established the reversed U shape of the relation between involvement in the program and advertising efficiency. These researchers stated that memorization and the viewers' attitude toward the advertisement (Aad) are more positive when involvement in the program is moderate than when it is low or high. This observed phenomenon supports the inverted U theory (Kroeber-Riel, 1979). According to this theory, the quality of the accomplishment of a task is a inverted-U function of the individual's activation level: At first, a rising activation makes the processing of a piece of information easier, but beyond a certain optimal activation level, information processing is hindered.

The only study carried out among children aged 7 to 10, and which gets near this issue is in harmony with the negative effects thesis (Prasad and Smith, 1994). Through experimentation, this study has put forward the idea that children who are exposed to an advertisement that is inserted immediately after a segment of a highly violent TV program, show attitudes toward the advertisement as well as the promoted brand that are less favorable than those shown by children who watched the advertisement following a less violent program (which is nonetheless similar in every other aspect).

It comes out of the only study dealing with children—cited above—and of the findings of an exploratory study, which we conducted, that the “negative effects thesis” would best reflect the way children react to an advertising cut that occurs at a moment of high intensity.

It ensures that the child tends to reject the advertisement interrupting a program if the emotional experience lived during this program (detective or action movies) is intense. This leads us to state the following hypothesis:

**Hypothesis 1:** The intensity of emotions generated by a TV program has a significant and negative influence on the child’s attitude toward the advertising message inserted in this program.

### **Valency of emotions and attitude toward the advertisement**

Previous research works agree on the fact that emotions created by a program will influence the evaluation and the judgment of advertisements in a way that is congruent with the mood created by the exposition to this program (Gardner, 1985; Bower, 1981; Isen, 1984). The corollary of this is that an advertisement is better appreciated if it is broadcast in a cheerful media context that will raise positive emotional reactions (a comedy, for example), than when the program is sad and hence generating negative emotional reactions (a sad movie, for instance) (Axelrod, 1963; Srull, 1983). Several theories have been proposed to account for the observed mood assimilation effect.

According to the Mood Congruency hypothesis, the mood induced by a programming context activates—during the watching of the advertisement that follows it—some cognition that are stored in the memory, in relation with the promoted product, the people, the events, or any other things that are described in the advertisement, and that have a valency similar to this mood. Thus, a program generating a positive (or negative) mood strengthens accessibility—from the memory—to the positive (or negative) material, which will affect the evaluation of the product and the brand.

Relying on an experimental study, Goldberg and Gorn (1987) have noticed that individuals who have watched a TV program dealing with a

happy theme (a comedy) feel happy while watching a following advertisement, and develop positive thoughts about it, they consequently evaluate it more favorably (they perceive it as being more efficient), which is not the case for individuals who have been exposed to a sad program. It can thus be said that the emotional tone of the generated cognitive responses to an advertisement reflects the mood felt during exposition to advertisements. It also reflects the evaluation of these advertisements. This hypothesis was supported by other research works conducted among adult audiences (Bower and Cohen, 1982; Clark and Isen, 1982; Mathur and Chattopadhyay, 1991; Srull, 1983; Singh and Hitchon, 1989).

Some authors have declared that the temporary association of two stimuli, such as a TV program and an advertisement, can account for the transfer of emotion from one stimulus to the other (Gorn, 1982; Kroeberiel, 1984; Batra and Stayman, 1990). This transfer resulting from a temporary association does not involve the activation, from the memory, of the similar valency material. Therefore, the program's effect on the advertisement's evaluation is not mediated by beliefs drawn from memory, as is the case with the Mood Congruency theory, but it springs from a classical conditioning process in which attitudes are conditioned by mood (Lutz et al, 1983).

The hypotheses of the halo effect and the heuristic effect are also presented as plausible tools to explain this phenomenon. The halo effect can be defined as the unconscious transfer of emotion from one concept (in this case a TV program) to the other (in this case, the advertisement). The "How-do-I-feel-about-it" heuristic effect, on the other hand, stipulates that the anticipated mood about an object can be used as a basis to evaluate this object. These two processes occur when the respondents rely on their emotional states as persuasion peripheral signs, or as a source of information. In relation with the media context, individuals simplify their judgment of a TV advertisement relying on the emotional state they experience while watching a TV program in which the advertisement is inserted (Schwarz and Clore, 1988; according to Pecheux and Derbaix, 2002; Schwarz, 1990). In this case, a person who has positive feelings after having been exposed to the program is likely to provide a positive judgment about the stimuli surrounding it (the advertisement inserted in it). The person

does assume that this environment (the advertisement) is responsible of her pleasant emotional state.

Besides, other studies supporting processes which are different from the emotion transfer process have found out that a positive mood weakens, rather than improves, the processing of advertisements. More particularly, these studies have shown that advertisements inserted in programs perceived as pleasant or cheerful get a less favorable judgment and are not well memorized. Two explanations related to the observed contrast effect have been put forward (Lee and Sternthal, 1999). According to the cognitive capacity theory, a cheerful mood activates very wide knowledge structures in the memory, which weakens the processing of new information (Mackie and Worth, 1989). As for the feeling-as-information theory, it postulates that a person who experiences a positive mood tends to avoid all stimuli (such as an advertisement) that are likely to alter her mood. According to these two theories, after having been exposed to a media context which was able to generate positive emotions, a viewer who is in good spirits no longer pays attention to advertising inserted in this context. He would treat it more superficially and thus, would show weaker Aad and memorization scores.

Finally, other research works have concluded on the absence of any direct effect of the moods generated by the media context on the evaluation of an advertisement delivered within this context. These works have proved the existence of a mediating variable called "Program appreciation". In fact, Murry, Laastivicka and Sing (1992) - in the same way as Coulter (1998) - have shown that whatever the valency of the emotional state (positive or negative) generated by the program, the evaluation of the advertisement inserted in it is first determined by the program appreciation.

Contrarily to the literature dealing with adults, which reports contradictory findings, the literature dealing with children supports the idea of a direct and congruent impact of the emotions generated by a program on the evaluation of an advertisement inserted in this program (Prasad and Smith, 1994; Pecheux and Derbaix, 2003). More precisely, according to a study led by Pecheux and Derbaix (2003), a program inducing a positive mood (cartoons) leads children to evaluate the advertisement inserted in it in a more positive way than it is the case with a program inducing a neutral mood (a documentary about plastic recycling). For moral considerations, these authors have not taken negative emotions into account. According to

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the study of Prasad and Smith (1994), a program raising negative emotions would result in unfavorable responses toward the advertisement inserted in it. These findings are in harmony with the theories of mood transfer or also with the mood misattribution theory. Hence, we suppose that:

**Hypothesis 2:** The valency of the emotions generated by the TV program has a positive and significant influence on the child's attitude toward the advertisement inserted in this program.

### **Program appreciation and attitude toward the advertisement**

It has been proved that the affect induced by the program and its appreciation are two distinct constructs (Madden et al, 1988; Murry and Dacin, 1996). While the emotion generated by the program is a temporary sentimental or affective state (Gardner, 1985), the appreciation of the program represents a conscious global evaluation of, or an attitude toward a TV program (Schumann, 1986). Thus, the program appreciation corresponds to the favorable/unfavorable feature of the judgment of the viewed program by the child.

Studies dealing with the relation between the program appreciation and Aad are few and little conclusive. Schematically, two thoroughly contradictory streams have emerged, reflecting, on the one hand, the positive effects hypothesis, and on the other, the negative effects theory.

The first theory (the positive effects theory) postulates that highly-appreciated programs or those starting off positive emotions will induce more favorable responses on the part of the audience, toward advertisements surrounding them or inserted in them (Schumann, 1986; Murry et al, 1992; Coulter, 1998; De Pelsmacker et al, 2002). Rather than wearing off immediately with the casting of the advertising screen, attention given to a highly appreciated program remains activated. This produces a positive effect on the messages' performance, and a better Aad (Krugman, 1983). All the theories related to emotion transfer, such as the mood congruence hypothesis, the temporary association between the program and the advertisement, the heuristic and the halo effects, are pertinent to account for such an effect, that is the fact that the persons who appreciate a

media context feel a positive mood and report this attitude or this mood to the advertising stimulus (De Pelsmacker et al, 2002).

The second hypothesis, that of the negative effects, supports opposite consequences: advertisements inserted in a well-appreciated program are perceived as an interruption which contrasts with the deeply positive experience undergone by the viewer during the program. Advertising messages tend to be physically avoided or mentally filtered, which may result in weakening the attitude toward the advertisement (Steiner, 1963 ; Steiner, 1966 ; cited in Schumann and Torson, 1990). This observed phenomenon, that is the fact that advertisements which are inserted in appreciated programs get a less favorable judgment, reflects a process that is different from that of emotion transfer. In particular, this finding supports the hypotheses of the cognitive capacity theory and the feelings-as-information theory, mentioned earlier in relation with the negative effect of positive emotions raised by a media context on the efficiency of an advertisement.

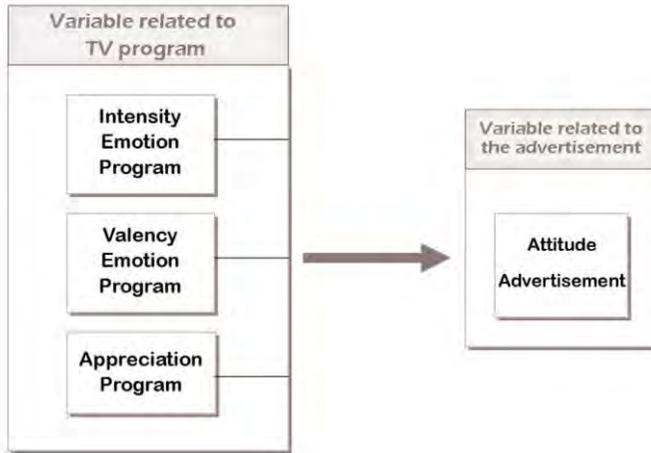
The only study carried out among children which focused on the role of program appreciation in advertising persuasion has reached a result that agrees with the negative effects stream (pecheux, Derbaix and Poncin, 2006). It follows from this research that the appreciation of a program is negatively correlated with Aad. In other words, an advertisement that is inserted within a program which the children do not like (the news) is perceived as more efficient than one that is introduced in a pleasant program (Star Academy). This finding is in agreement with the one reached by Greer et al (1982), for whom attention toward an advertisement increases if the latter contrasts with the program.

By analogy with the findings of Pecheux, Derbaix and Poncin (2006) and Greer et al (1982), and contrarily to the predictions of the mood transfer theories, we suppose that the appreciation of a program by the child has an unfavorable effect on the advertisement's performance in terms of Aad.

**Hypothesis 3:** The appreciation of a TV program has a negative and significant effect on the attitude of the child toward the advertisement inserted in this program.

## The conceptual model

The figure below schematizes the conceptual model we are proposing. This latter consists in the integration of the different constructs mentioned above.



In this conceptual frame, the valency of the program-induced emotions, their intensity, and the appreciation of the program appear to be determinants of the attitude toward the advertisement.

## Discussion and conclusion

This article was meant to conceptualize the media context effect on advertising performance among a population of children. For this purpose, we have first analyzed the main theoretical and empirical works carried out on this theme, in relation with two fundamental dimensions related to media context: the appreciation of the program and the emotions that the program generates in the audience. After this survey, two conclusions could be drawn. On the one hand, we noticed that the current state of knowledge is marked by a lack of consensus on a variety of themes. Thus, several theories, having opposite consequences, have been developed to account for and predict the effects of the programming context on advertisements. As a

corollary, the findings in this field are characterized by a lack of coherence. On the other hand, we noticed that the theme of the media context effect has not been enough investigated among young audiences. Hence, an exploratory qualitative research was conducted among children. More precisely, several observations were realized in different kindergartens. Our conceptual model, together with the body of hypotheses underlying it, has eventually been developed. Overall, it is the negative effects stream which best represents the program impact on children, through the dimensions of emotion intensity and appreciation. Nevertheless, it is the positive effects theory that is best adapted when it comes to the transfer of the valency of the program-induced emotions on the children's responses to advertisements. We need to precise, here, that an experimentation was conducted on 400 schoolchildren aged 10 to 12, in order to test our model empirically.

### **The theoretical interest of the research**

Researching the effect of media context involves numerous academic implications. This work makes it possible to shed light on a research field that was not well explored in the field of marketing destined to children. Moreover, the conceptual model which we propose corresponds to a thoroughly new global approach to the media context effects on children. Indeed, it is most probable that the media context impact would be underestimated, overestimated or misunderstood, if we ignored the joint and relative effect of the emotions raised by the program and its appreciation. Once validated, the model would provide a more refined understanding of the underlying mechanisms of the program effects on children (assimilation effect vs. contrast effect). Hence, it widens the knowledge related to the children's attitude formation processes under the effect of media contexts.

### **The managerial interest of the research**

As for managerial implications, this study primarily interests media planners. It helps them in their choices when they have to buy advertising spaces. It is equally interesting for advertisers, as it provides them with a

new control criterion to be used in pretesting the efficiency of their advertisements in terms of attitudes toward the advertisement and the brand.

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## Equity Mutual Fund: Performances, Persistence and Fund Rankings

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*This study focuses on open-ended equity mutual funds in Thailand. The funds' performances were examined whether the returns significantly and persistently out-perform the market; whether the use of different measures leads funds with similar rankings. The analyses use various metrics: the traditional fund performance evaluation measures and Data Envelopment Analysis (DEA) technique; Pearson's correlation coefficients, and cover six different investment horizons. The results suggest that open-ended equity mutual funds analyzed in this study significantly out-perform the market, and the funds' positive performance sustains for 3-month time-period of investment, at least. The top five funds managed by the Aberdeen, Bangkok Bank and Siam Commercial Bank Asset Management Companies out-perform the bottom five funds between 0.1912 and 1.3187 for six time-periods of investment from 1-month to 5-year. Finally, it is concluded that for individual investors, the results provided by this study can be guidelines for selecting mutual funds for investment.*

**Keywords:** mutual fund, equity fund, open-ended fund, fund ranking

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### Introduction

Mutual funds have dramatically increased role in financial markets in recent decades. As of the end of 2007, the world mutual fund industry

managed financial assets exceeding \$26 trillion (including over \$12 trillion in stocks), more than four times the \$6 trillion of assets managed at the end of 1996 (Investment Company Institute, 2008, cited in [1]). The number of mutual funds has also grown considerably to more than 66, 000 funds worldwide at the end of 2007, including nearly 27, 000 equity funds or approximately 40.91%. Although the growth of the mutual fund industry started in the U.S., where the industry plays an extremely important role in stock markets, this trend has spread more recently to other countries around the world [2].

In Thailand, the mutual fund industry started with the first local closed-end fund in 1977 with an initial size of only 100 million baht. The fund was established by the first asset management company, Mutual Fund Company Limited (MFC). Thai mutual funds have been classified by their objectives and/or policies. These are equity fund, debt fund and balanced fund; open-ended fund and closed-end fund; onshore mutual fund and offshore mutual fund; short-term fixed income fund and long-term fixed income fund; and other types of mutual funds such as flexible portfolio fund, fund of funds, warrant fund, property fund, retirement mutual fund and sector fund. The number of these funds and their total assets have increased over time from 240 funds outstanding with total assets of 345.80 billion baht in 1999 to 815 funds and 1,372.87 billion baht in 2007 (as of April 27). At the time, the market share of Thai open-ended equity funds of 138 funds was 5.58%.

This tremendous growth has presented investors with a new dilemma. Most individual investors have been facing choice of investment funds. Apart from the press, which is the primary source of information for investors, individual investors rely on the help of financial planners and other sources of information, such as security analysts, mutual fund management companies and Association of Investment Management Companies (AIMC) (also see [3]).

According to a 1995 survey by the Investment Company Institute, 52% of the respondents rely primarily on printed information in newspapers, magazines and investment newsletters when making mutual fund investment decisions [4]. In addition, an industry, such as Morningstar and Lipper, collects data on mutual funds to compare and rate fund

performance, and supplies investors with information for investment decisions [1]. These sources of information typically provide investors with rankings of mutual funds based on risk-adjusted performance measures. If mutual fund performance is predictable, using these rankings may help investors select funds that will continue to out-perform in the future. In contrast, if performance does not persist, rankings based on past returns have no value [4].

The persistence of mutual fund performance is another issue focused more by studies. For example, [5] Find that funds with the highest returns in the past 12 months are more likely to have above average return in the next 12 months. [6] Suggests that mutual fund returns strongly persist over multi-year periods. [7] Argue that investors use information on persistence as a significant positive relationship exists between fund flows and past returns. However, [4] Does not support this theory. Therefore, the results are inconclusive.

Although most mutual fund studies have concentrated on the use of risk-adjusted performance measure as an alternative for individual investors in selecting investment opportunities, returns on investing in a fund (given risk) reflect the impact of all other factors. [8] Assert that there are several measures can be used to rank mutual funds and the choice of the performance measure is actually important for mutual fund ranking and selection. In this regard, a multi-criteria approach, which simultaneously considers other variables, is appealing. Thus, apart from the traditional fund performance evaluation measures, including the Treynor ratio, Sharpe ratio and Jensen's alpha, this study applies the Data Envelopment Analysis (DEA) technique to evaluate performance of open-ended equity mutual funds in Thailand.

Past studies of equity mutual fund had emphasized on closed-ended funds rather than open-ended funds. Even though the number of open-ended funds has been increasing, studies related to the mentioned topics on emerging markets, especially Thailand, have been limited. Hence, it is justified to carry out a comprehensive study of performances of open-ended equity mutual funds in Thailand. The investigations largely focus on the funds' abnormal returns compared to the market using several different metrics; whether or not the funds significantly and persistently out-perform

the market; whether the use of different measures leads funds with similar rankings; and finally providing fund rankings.

As Thailand is an important emerging market in South-East Asia that reduces risk and increases expected returns, rendering significant diversification benefits for globally-minded investors [9] and [10], the results presented by this study can be guidelines for both local and foreign individual investors. Finally this study makes contributions to the literature in terms of a variety of results for Thai open-ended equity mutual funds added to this area for emerging markets.

The study is organized as follows: *Section 1* introduces mutual funds. *Section 2* reviews the literature of relevant studies of funds' performances. *Section 3* describes data and presents several of fund performance evaluation methods used for analyses in this study. *Section 4* includes analyses and results and the last section provides conclusions of the study.

## Review of Literature

Although investors display some fund selection ability due to investing in funds with subsequent good performance, in an efficient market, mutual fund managers cannot beat the market and any superior performance is simply luck and does not persist [4]. Early studies on mutual funds; see, for example, [11] and [12] Support the efficient market hypothesis, but later studies such as [13] and [14] Find that past performance of mutual funds can predict future performance. Studies e.g., [15], [16], [17], [18], [19], [11] and [20] conclude that mutual funds under-perform the market. Meanwhile [21] Shows that performance persistence can be attributed to a momentum factor, [22] Uses a large sample of mutual funds and finds performance persistence during 1973-1981, but there is no evidence of persistence during 1982-1991.

Apparently, the evidence on performance of funds and funds' performance persistence are mixed. However, the more recent findings cast doubts on the efficient market hypothesis and rekindle investors' hope of earning abnormal returns by plowing through historic performance records.

For example, [23], [6] and [7] suggest that money flows to past good performers.

The literature focuses in general on the U. S. mutual fund industry; see, for example, studies on the U.S. market by [24]; [25] and [1]. Several authors examine fund performances in individual developed countries, such as studies on the U.K. market by [26]; studies on Netherland by [27]; studies on Australia by [28]; France by [29]; Italy by [30] and [31]; Japan by [32]; Sweden by [33]. For emerging countries, although they have attracted the attention of investors all over the world, there have been much less studies on mutual funds; e.g., studies on the Greek market by [34], [35], [36] and [37]; and other markets by [38], [9], [39], [40], [41], [7] and [42].

Notice that U.S. funds are much larger than elsewhere in the world, and domestic funds are larger than international funds, on average. There are reasons to believe that results of studies may be different as there are significant different characteristics between the U.S. mutual fund industry and the rest of the world. These factors include fund size, style, age, fee, economic and financial development, quality of legal institutions and law enforcement, mutual fund industry structure and others (see [43], [2] and [44]). For example, [1] Find mutual funds under-perform the market overall, but provide strong evidence of short-run persistence in both domestic and international funds; however, the persistence is much weaker in non-U.S. domestic funds (also see [24] and [45]). Meanwhile, [4], a U.S study, reports the results do not support the short-term persistent performance hypothesis. In addition, evidence indicates that there is a strong positive relation between the performance of domestic mutual funds and a country's level of financial development; funds domiciled in countries of common-law traditions perform better; and investors in the U.S. have some ability to select funds as money flows to funds with good future performance [23].

For emerging markets, [27], a Mexico study, find persistence in mutual fund performance both over consecutive times and in the multi-period setting. [36], a Greek study, analyze the behavior of 23 mutual funds for the period 1997-2000 and conclude that the mutual fund industry is relatively young resulting in no definite conclusion. [38], a study on Indian mutual funds, reveal that performance of the fund managers affects the returns of the firm. Moreover, mutual fund is not a widely discussed subject

in developing markets including Thailand, when compared to others. Among few studies that have focused on Thai mutual funds, [46] employs the Jensen's alpha, the condition model, factor model and portfolio holding model to measure performance of 114 equity funds, and reports statistically insignificant positive returns. [47] Uses monthly NAV and its flow during January 2000 to December 2002 to estimate returns. The performance of the 222 equity funds was examined using the Treynor ratio, Sharpe ratio and Jensen's alpha. The results out-perform the market, but there is no persistency in performance during the periods of study, which are inconsistent with [1], [7] and [6].

Apart from a limited number of studies on Thai equity mutual funds, these studies have focused on closed-end funds rather than open-ended funds, even tracking the indexes much better than closed-end funds [9]. Moreover, the studies have also been restricted to the conventional fund performance measures. Using more several and different measures may result in a range of outcomes compared to past studies, and this can increase a variety of choices of investment opportunity for individual investors. However, the doubts whether or not the results obtained using diverse measures are reliable leading the selection of measures for analysis funds' performance is contentious. [48] And [49] Persist that choosing a performance measure is not critical to fund evaluation. Meanwhile, [8] and [50] Contend that the choice of performance measure is important to the performance analysis and selection of mutual funds, and that fund rankings also depend on the applied measures.

Thus, the used performance evaluation method is another controversial issue. Meanwhile a number of past studies employed extensive and sophisticated statistical tools, many studies have applied only the conventional evaluation methods. The Sharpe ratio is suggested as the most widely known and used performance measure for the mutual fund industry.

To disentangle the impact of methods of evaluating the funds' performance, more methods are used in the analyses. Thus, this study evaluates performances of 138 open-ended equity mutual funds, which were managed by the seventeen asset management companies based in Thailand between May 2002 and April 2007. The funds' performances were examined using both the traditional approaches: the Treynor ratio, Sharpe ratio and

Jensen's alpha; and the multi-criteria method: the DEA technique; and then the results were compared to those of the index of the Stock Exchange of Thailand (SET index) whether the average fund performance is significantly and persistently greater than the market. The strength of relationships between the results derived using different measures was also analyzed. Finally, the performances were compared to establish fund rankings, which can be guidelines for individual investors to select mutual funds for their investments.

## Data and Methodology

Most Thai studies of mutual funds have been closed-end fund performance analyses, used weekly returns, examined short time-period of data and applied a limited number of performance evaluation methods. This study uses monthly and longer time-period of data covering net asset values and dividends for the five-year period (May 1, 2002 - April 30, 2007). A larger sample consisting of the returns on the portfolio of 138 open-ended equity mutual funds was examined. There are four significant sources of data used for analyses in this study set out as follows: the AIMC, asset management companies, the SET and finally, the Bank of Thailand (BOT) is another source providing 91-day coupon rate of the Thai government bonds.

In early studies, portfolio performance was evaluated mostly in terms of returns because risk was difficult to quantify and it could not be incorporated in evaluation, as there was no measure that combined both return and risk. Recent studies, for example, [52] Suggest that returns on portfolios that belong to the same risk class can be compared using the three different approaches of portfolio performance measurement: the Treynor ratio, Sharpe ratio and Jensen's alpha. These are absolute measures of portfolio performance, which can be also used to rank different portfolios. [27] Suggest that risk-adjusted performance measures are frequently used to rank investment opportunities. Investors, who are displaying a sufficiently high level of risk or loss aversion, should use a ranking based on the Sharpe ratio, or the expected return measure. A number of studies applied these methods or part of them, e.g., [53], [36], [54], and [55]; and Thai studies,

such as [47]. Thus, so far, mutual funds' performance have primarily been evaluated and ranked using the traditional measures.

Explicitly, [52] and [51] Assert that the DEA technique can be used to assess mutual funds' performance. The measurement of relative efficiency was addressed by [56] (also see [51] and [11]) and the DEA technique was initiated by [57], and has been applied and revisited by several studies, including [58], [59], [60], [61], [62], [63], [64] and [65].

To answer a question whether or not a method of fund performance measures provides similar rankings compared to the use of different measures, several studies find rank correlation between the rankings according to two measures assessing the values of the Spearman's rank correlation coefficient. However, [50] Suggests that there is no clear interpretation of a particular value for the Spearman's rank correlation coefficient and thus, the value of the coefficient can be misleading (also see [66]). Finally, he concludes that a rank correlation depends on the investment horizon and there are plenty of alternative performance measures exhibiting decreasing rank correlation as horizon increases.

Thai studies on performances of mutual funds mainly used the traditional measures of risk and return or the single rather than multi-criteria approach. These studies have ignored other variables such as diversification, selectivity, market timing, fund management expenses, transaction costs and others. To have a variety of results and check robustness, this study applies several more methodologies. Apart from the traditional performance evaluation methods: the Treynor ratio, Sharpe ratio and Jensen's alpha; the DEA technique is employed. The Pearson's correlation coefficients also were calculated for relationship assessments between different performance evaluation measures. Furthermore, the different investment horizons of the analyses of fund performances consisting of six time-periods are included: 1-month (April 1, 2007 – April 30, 2007); 3-month (February 1, 2007 – April 30, 2007); 6-month (November 1, 2006 – April 30, 2007); 1-year (May 1, 2006 – April 30, 2007); 3-year (May 1, 2004 – April 30, 2007); 5-year (May 1, 2002 – April 30, 2007).

**Treynor ratio**

$$T_p = \frac{r_p - r_f}{\beta_p} \dots\dots\dots(1)$$

Where  $T_p$  is the Treynor ratio,  $r_p$  the portfolio return,  $r_f$  the risk-free return and  $\beta_p$  the systematic risk.

**Sharpe ratio**

$$S_p = \frac{r_p - r_f}{\sigma_p} \dots\dots\dots(2)$$

Where  $S_p$  is the Sharp ratio,  $r_p$  the portfolio return,  $r_f$  the risk-free return and  $\sigma_p$  the total risk of portfolio.

**Jensen's alpha**

$$J_p = r_p - \{r_f + \beta_p(r_m - r_f)\} \dots\dots\dots(3)$$

Where  $J_p$  is the Jensen's measure for portfolio,  $r_p$  the portfolio return,  $r_f$  the risk free return,  $\beta_p$  the systematic risk and  $r_m$  the market return.

**Data Envelopment Analysis (DEA)**

$$\text{Max } E_k = \frac{\sum_{o=1}^t u_o y_{ok}}{\sum_{i=1}^m v_i x_{ik}} \dots\dots\dots(4)$$

Subject to:

$$E_k = \frac{\sum_{o=1}^t u_o y_{ok}}{\sum_{i=1}^m v_i x_{ik}} \leq 1 \quad k = 1, 2, \dots, n$$

$$u_o \geq 0 \quad o = 1, 2, \dots, t \quad v_i \geq 0 \quad i = 1, 2, \dots, m$$

Where  $E_k$  is the DEA score of  $k^{th}$  DMU,  $y_{ok}$  the amount of the  $o^{th}$  output for the  $k^{th}$  DMU,  $x_{ik}$  the amount of the  $i^{th}$  input for the  $k^{th}$  DMU,  $u_o$  the weight assigned to the  $o^{th}$  output,  $v_i$  the weight assigned to the  $i^{th}$  input,  $t$  the number of outputs,  $m$  the number of inputs and  $n$  the number of DMUs.

The inputs of the model are the weighted fees and expenses, systematic risk and total risk. The outputs are returns, diversification and manager skill.

In Thailand, the appropriate performance benchmarks used to compare mutual fund returns have been defined by the AIMC. These are the SET index, which is the most widely used as Thai market benchmark for equity funds, and the SET 50, which is also used for equity fund benchmark. However, in this study the SET index is selected as the performance benchmark.

The net return that an investor achieves in investing in a mutual fund depends on dividend and capital gain or loss that comes from the change in the net asset value. Returns of the mutual funds and the market in a time-period were calculated as:

$$\text{Fund return} = \left( \frac{\text{NAV}_{t+1} + \text{Div}_{t \rightarrow t+1}}{\text{NAV}_t} - 1 \right) \times 100 \quad \dots\dots\dots(5)$$

Where  $\text{NAV}_t$  is the NAV at the buying month,  $\text{NAV}_{t+1}$  the NAV at the month-end of a period and  $\text{Div}_{t \rightarrow t+1}$  the amount of cash distributed during the period to shareholders.

$$\text{Market return} = \left( \frac{\text{SET}_{t+1}}{\text{SET}_t} - 1 \right) \times 100 \quad \dots\dots\dots(6)$$

Where market return is the return on the SET index,  $\text{SET}_t$  the SET index at the buying month and  $\text{SET}_{t+1}$  the SET index at the month-end of a period.

Risks were estimated as the expressed equation:

$$\text{Var}(r) = \frac{1}{n} \sum_{i=1}^n [r_i - r_{am}]^2 \quad \dots\dots\dots(7)$$

Where  $r_i$  is the return of individual mutual fund and  $r_{am}$  the mean rate of returns.

$$r_p = \alpha + \beta \times r_m + e_p \quad \dots\dots\dots(8)$$

Where  $r_p$  is the portfolio return,  $\alpha$  the intercept term,  $\beta$  the systematic risk,  $r_m$  the market return and  $e_p$  the error term.

The regressing of systematic risk also provided the value of  $r^2$  that gives the strength of correlation between the fund returns and the market indicating the diversification.

$$\text{Manager's investment skill} = (r_p - r_f) - (\sigma_p / \sigma_m) (r_m - r_f) \quad \dots\dots\dots(9)$$

Where  $r_p$  is the portfolio return,  $r_f$  the risk free return,  $r_m$  the market return,  $\sigma_p$  the total risk of portfolio and  $\sigma_m$  the total risk of the market.

This study finds relationship between the results of performance indexes calculating the Pearson's correlation coefficient, which was computed following the given formula.

$$\rho_{XY} = \frac{\text{cov}(X,Y)}{\sigma_X \sigma_Y} \quad \dots\dots\dots(10)$$

Where  $\sigma_X$  is the standard deviation of  $X$ ,  $\sigma_Y$  the standard deviation of  $Y$ ,  $\rho_{XY} > 0$  the values of data set  $X$  increase or decrease in the same direction of set  $Y$ ,  $\rho_{XY} < 0$  the values of data set  $X$  increase or decrease in opposite direction of set  $Y$  and  $\rho_{XY} = 0$  there is no correlation between data set  $X$  and  $Y$ .

To test the null hypothesis that the mean return for a sample of  $n$  funds is significantly greater than the market,  $t$ -test statistic is applied.

$H_0$ : Open-ended equity funds under-perform the market

$H_1$ : Open-ended equity funds out-perform the market

To verify if the different performance measures provide the same evaluation about funds, the study finds a relationship between performance indexes by using the Pearson's correlation coefficient. Therefore, two hypotheses to be tested are:

$H_0$ : There is no positive relationship between the two performance indexes

$H_1$ : There is a positive relationship between the two performance indexes

## Results

The following section presents the results of the analyses of performances of 138 open-ended equity mutual funds, managed by the seventeen asset management companies in Thailand between May 1, 2002 and April 30, 2007. The analyses include six different time-periods of investment from 1-month to 5-year horizon. Specifically, this study evaluates Thai open-ended equity mutual funds' performances whether or not they significantly and persistently out-perform the market. To indicate if there is a significantly positive correlation between the two results estimated using different measures, the Pearson's correlation coefficient was also computed and analyzed. Finally, the study compares the funds' performances to provide fund rankings, which can be acceptable investment guidelines.

**Table 1:** Performances of Open-ended Equity Mutual Funds Compared to the Market Evaluated Using the Treynor, Sharpe, Jensen's Alpha and DEA Measures; and Presentation of the Pearson's Correlation Coefficients Analyzing Degrees of Correspondence between Results According to the Different Measures

Time period	Treynor (1)	Sharpe (2)	Jensen's alpha (3)	DEA (4)	(1) vs (2)	(1) vs (3)	(1) vs (4)	(2) vs (3)	(2) vs (4)	(3) vs (4)
1-Month	.0062* 89%	.4519* 73%	.0063* 89%	.0086* 49%	.843* *	.920* *	.359* *	.914* *	.240* *	.341* *
3-Month	.0091* 100%	.9919* 98%	.0080* 100%	.0213* 80%	.890* *	.901* *	.361* *	.929* *	.271* *	.247* *
6-Month	.0048* 98%	.2484* 98%	.0044* 98%	- .0143 78%	.999* *	.931* *	.095* *	.943* *	.086* *	-.021
1-Year	.0035* 96%	.2305* 96%	.0033* 96%	- 0161 78%	.999* *	.942* *	.040	.947* *	.041	-.059
3-Year (N=99)	.0026* 91%	.1940* 90%	.0025* 91%	- .0124 83%	.989* *	.971* *	.036	.983* *	-.008	-.062
5-Year (N=75)	.0082* 100%	.1525* 87%	.0054* 100%	- .0056 76%	.913* *	.940* *	.068	.967* *	-.047	-.076

Note: Columns 2-5 present the performances of the funds in terms of out-performance or under-performance compared to the market for six different investment horizons evaluated using the different measures; Columns 6-11 present the Pearson's correlation coefficients indicating the relationships between results according to the different measures; The percentage presents the number of out-performers compared to the market; N = Total number of open-ended equity mutual funds or 138, except it is stated differently in the parentheses \*significant at 5% level; \*\*significant at 1% level

Table 1 shows that on average, the performances of Thai open-ended equity mutual funds significantly out-perform the market for all time-periods of investment, when measured using the Treynor ratio, Sharpe ratio and Jensen's alpha. The results in terms of positive excess returns are accordance with those suggested by past studies on developed markets,

such as [67], [45] and [23], but are not in line with those reported by [30] and [4]. Also, the results are consistent with those reported by studies on emerging markets, such as [47] and similar to those of [52], but are not supported by [46]. Moreover, the evidence provided by this study indicates that the existing abnormal returns are persistent which is entirely consistent with studies, e.g. [7] and [6].

When the DEA technique is used, the results suggest that for 3-month time-period of investment, performance of the equity mutual funds significantly out-performs the market; meanwhile for 1-month and 1-year time-periods, the funds significantly under-perform the market. This explains that different methods can give different outcomes and that for investors, who are evaluating funds' performances using the multi-criteria method, should be careful to select their open-ended equity funds.

However, it is concluded that Thai open-ended equity mutual funds analyzed in this study significantly out-perform the market, and the funds' performance sustains for 3-month time-period of investment, at least.

For further analyses, the results suggest that for 1-month time-period of investment, there is the smallest number of out-performers; or the percentage of total funds outperforming the market is lowest. By comparison based on 1-month time-period of investment, the investment time-period extends, the percentage of total funds outperforming the market increases.

The study assesses correlation between the results obtained using different performance evaluation measures in the analyses, and presents that there is a good relation between the traditional measures. There is high correlation between the results estimated using the Treynor and Sharpe ratios; the Treynor ratio and Jensen's alpha; and the Sharpe ratio and Jensen's alpha. Meanwhile, the evidence indicates low correlation between the traditional measures and the DEA technique.

Finally, the funds' performances according to different performance evaluation measures were compared and ranked as shown (only top ten best performers) in Tables 2-3.

**Table 2:** Top Ten Best Performers Ranked Based on Different Performance Evaluation Measures for 1-month, 3-month and 6-month Time-periods of Investment; and Comparison of the Average Performances of Open-ended Equity Mutual Funds and the Market

1-month				3-month				6-month			
Treynor	Sharpe	Jensen	DEA	Treynor	Sharpe	Jensen	DEA	Treynor	Sharpe	Jensen	DEA
SCBLT3 (SCB)	SCBLT3 (SCB)	SCBPMO (SCB)	ABSM Aberdeen	ABSM Aberdeen	ABSM Aberdeen	B-INFRA (BBL)	ABSM Aberdeen	ABSM Aberdeen	ABSM Aberdeen	B-INFRA (BBL)	ABSM (Aberdeen)
SCBPMO (SCB)	SCBPMO (SCB)	SCBLT3 (SCB)	SCBLT3 (SCB)	SCBPMO (SCB)	SCBLT3 (SCB)	ABSM Aberdeen	SCBLT3 (SCB)	B-INFRA (BBL)	B-INFRA (BBL)	BKA2 (BBL)	SCBLT3 (SCB)
ABSM (Aberdeen)	ABSM (Aberdeen)	ABSM (Aberdeen)	ABSC-RMF (Aberdeen)	SCBLT3 (SCB)	SCBPMO (SCB)	SCBPMO (SCB)	RL7030 (Kasikorn)	SCBLT3 (SCB)	SCBLT3 (SCB)	BKA (BBL)	AYFSTECH (Ayudhya)
1VAL-D (One)	1VAL-D (One)	1VAL-D (One)	RL7030 (Kasikorn)	AYFSTECH (Ayudhya)	IBP (Prima vest)	SCBLT3 (SCB)	AYFSTEC H (Ayudhya)	BKA2 (BBL)	BKA2 (BBL)	BERMF (BBL)	B-INFRA (BBL)
V-RMF (One)	V-RMF (One)	V-RMF (One)	AYFSTEC H (Ayudhya)	B-INFRA (BBL)	B-INFRA (BBL)	BTP (BBL)	SCBPMO (SCB)	BKA (BBL)	BKA (BBL)	BTP (BBL)	MAX DIV LTF (Siam City)
B-INFRA (BBL)	RL7030 (Kasikorn)	B-INFRA (BBL)	BCAP (BBL)	AYFLTFDI V (Ayudhya)	RL7030 (Kasikorn)	AYFSTEC H (Ayudhya)	AYFLTFDI V (Ayudhya)	BERMF (BBL)	BERMF (BBL)	B-LTF (BBL)	BERMF (BBL)
ABG (Aberdeen)	KTTN (Krungthai)	KTTN (Krungthai)	SCBPMO (SCB)	SCBDV (SCB)	ABSC-RMF (Aberdeen)	IBP (Primavest)	B-INFRA (BBL)	BTP (BBL)	B-LTF (BBL)	B-SUB (BBL)	BKA2 (BBL)
RL7030 (Kasikorn)	SCBSET (SCB)	RL7030 (Kasikorn)	V-RMF (One)	IBP (Primavest)	BTP (BBL)	BKA2 (BBL)	SCBDV (SCB)	B-LTF (BBL)	BTP (BBL)	SCBLT3 (SCB)	B-LTF (BBL)
ABSC-RMF (Aberdeen)	SPT (Thana)	TFEQ (Kasikorn)	AYFLTFDI V	BKA2 (BBL)	ABG Aberdeen	B-SUB (BBL)	IBP (Prima)	AYFSTEC H	B-SUB (BBL)	IBP (Prima)	AYFLTFDIV (Ayudhya)

	chart)		(Ayudhya)				vest)	(Ayudhya)		vest)	
OSPD (Thanachart )	OSPD (Thana chart)	RKEDC (Kasikorn)	1S-LTF (One)	BTP (BBL)	BKA2 (BBL)	BKA (BBL)	BTP (BBL)	B-SUB (BBL)	AYFSTEC H (Ayudhya)	TVF (Kasikorn)	BKA (BBL)

Note: The funds were managed by the Thai asset management companies stated in the parentheses

Mean (N=138)											
0.0376	6.0448	0.0063	0.9354	0.0257	3.4219	0.0080	0.9482	0.0015	0.0760	0.0044	0.9079
SET Index											
0.0314	5.5925	0.0000	0.9440	0.0165	2.4299	0.0000	0.9269	-0.0033	-0.1724	0.0000	0.9222

**Table 3:** Top Ten Best Performers Ranked Based on Different Performance Evaluation Measures for 1-year, 3-year and 5-year Time-periods of Investment; and Comparison of the Average Performances of Open-ended Equity Mutual Funds and the Market

1-year				3-year				5-year			
Treynor	Sharpe	Jensen	DEA	Treynor	Sharpe	Jensen	DEA	Treynor	Sharpe	Jensen	DEA
ABSM (Aberdeen)	ABSM (Aberdeen)	BTP (BBL)	ABSM (Aberdeen)	ABG Aberdeen	ABG Aberdeen	BTP (BBL)	BTP (BBL)	ABG Aberdeen	ABG Aberdeen	B-INFRA (BBL)	ABG Aberdeen
B-LTF (BBL)	B-LTF (BBL)	B-LTF (BBL)	AYFSTECH (Ayudhya)	ABSC- RMF Aberdeen	ABSC-RMF Aberdeen	ABSL Aberdeen	ABSC-RMF Aberdeen	TVF (Kasikorn)	B-INFRA (BBL)	ABG Aberdeen	TVF (Kasikorn)
B-INFRA (BBL)	B-INFRA (BBL)	BKA2 (BBL)	B-INFRA (BBL)	ABSL Aberdeen	ABSL Aberdeen	ABG Aberdeen	ABG Aberdeen	B-INFRA (BBL)	BTP (BBL)	BTP (BBL)	B-INFRA (BBL)
BTP (BBL)	BTP (BBL)	BKA (BBL)	MAX DIV LTF	BTP (BBL)	BTP (BBL)	BKA (BBL)	BERMF (BBL)	BTP (BBL)	BKA (BBL)	BKA (BBL)	KPLUS2 (Kasikorn)

BAK2 (BBL)	BAK2 (BBL)	BERMF (BBL)	B-LTF (BBL)	B-INFRA (BBL)	BAK (BBL)	BAK2 (BBL)	OSPD (Thana chart)	BAK (BBL)	KPLUS (Kasikorn)	BAK2 (BBL)	KPLUS (Kasikorn)
BAK (BBL)	BAK (BBL)	B-INFRA (BBL)	AYFLTFDIV (Ayudhya)	BAK (BBL)	B-INFRA (BBL)	B-INFRA (BBL)	TVF (Kasikorn)	BAK2 (BBL)	KKF (UOB)	TVF (Kasikorn)	SCBRM4 (SCB)
ABSC-RMF (Aberdeen)	BERMF (BBL)	B-SUB (BBL)	BTP (BBL)	BERMF (BBL)	BERMF (BBL)	BERMF (BBL)	B-INFRA (BBL)	KPLUS (Kasikorn)	TDF (UOB)	KPLUS (Kasikorn)	NERMF (Thana chart)
BERMF (BBL)	ABSC-RMF Aberdeen	BTK (BBL)	ABSC-RMF (Aberdeen)	BAK2 (BBL)	BAK2 (BBL)	ABSC-RMF Aberdeen	BAK (BBL)	KKF (UOB)	BAK2 (BBL)	KKF (UOB)	AYFSTEC H (Ayudhya)
SCBLT3 (SCB)	SCBLT3 (SCB)	SCBLT3 (SCB)	BTK (BBL)	B-SUB (BBL)	B-SUB (BBL)	B-SUB (BBL)	BAK2 (BBL)	TDF (UOB)	APF (UOB)	TDF (UOB)	APF (UOB)
ABLTF (Aberdeen)	B-SUB (BBL)	IBP (Prima vest)	BAK2 (BBL)	TVF (Kasikorn)	AYFTW5 (Ayudhya)	TFEQ (Kasikorn)	B-SUB (BBL)t	B-SUB (BBL)	B-SUB (BBL)	APF (UOB)	TDF (UOB)

Note: The funds were operated by the Thai asset management companies stated in the parentheses

Mean (N=138)											
-0.0027	-0.1709	0.0033	0.9251	0.0042	0.3139	0.0025	0.9432	0.0167	0.8046	0.0054	0.9686
SET Index											
-0.0062	-0.4013	0.0000	0.9411	0.0015	0.1198	0.0000	0.9556	0.0085	0.6521	0.0000	0.9742

Table 2 presents that for 1-month time-period of investment, SCBLT<sub>3</sub>, SCBLT<sub>3</sub>, SCBPMO and ABSM are ranked No. 1 among the top ten best performers, when measured using each of the four performance evaluation measures. These open-ended equity mutual funds were managed by the SCB Asset Management Co., Ltd. and Aberdeen Asset Management Co., Ltd. respectively. For ranking assessment, there is evidence that the traditional measures have closer relationships with each another than the DEA technique, but the Jensen's alpha and the DEA technique are quite close showing the same second ranked funds. Five out of the top ten ranked funds are the same funds when ranked using all of the four different performance measures. These are ABSM, RL7030, SCBLT<sub>3</sub>, SCBPMO and V-RMF.

Meanwhile, for 3-month time-period, ABSM and B-INFRA are ranked No. 1 among the top ten best performers, as measured using each of the four performance assessment metrics. These open-ended funds were managed by the Aberdeen Asset Management Co., Ltd. and BBL Asset Management Co., Ltd. Among the traditional measures, the evidence shows that the relationship between the Treynor and Sharpe ratios is closer compared to that between the Sharpe ratio and Jensen's alpha. The DEA technique is closer the Treynor rather than the Sharpe ratio. However, 60% of the top ten best performance funds ranked using the four different measures are the same funds, which are ABSM, SCBLT<sub>3</sub>, SCBPMO, B-INFRA, BTP and IBP.

The funds' performance for 6-month time-period of investment presents that ABSM, ABSM, B-INFRA and ABSM are ranked No. 1 among the top ten best performers, as measured using each of the four performance evaluation methods. These open-ended funds were managed by the Aberdeen Asset Management Co., Ltd. and BBL Asset Management Co., Ltd. The relationships between the DEA method and the Treynor and Sharpe ratios are closer than that between the DEA technique and the Jensen's alpha. Six from the top ten funds ranked using the DEA method are the same funds ranked using the traditional measures. These are B-INFRA, B-LTF, BERMF, BKA, BKA<sub>2</sub> and SCBLT<sub>3</sub>. Notice that SCBLT<sub>3</sub> is ranked among the top ten best performers for 1-month, 3-month, and 6-month time-

periods of investment; meanwhile B-INFRA is ranked among the top ten best performers for both 3-month and 6-month time periods of investment.

For 1-year time-period of investment, ABSM, ABSM, BTP and ABSM are ranked No. 1 amongst the top ten best performers measured by each performance method. These open-ended equity mutual funds were managed by the Aberdeen Asset Management Co., Ltd. and BBL Asset Management Co., Ltd. In the aspect of ranking evaluation, the evidence indicates that the DEA technique has a closer relationship with the Treynor and Sharpe ratios than the Jensen's alpha. However, 40 % of the top ten funds ranked using the DEA technique, which are B-INFRA, BKA<sub>2</sub>, B-LTF and BTP, are the same funds ranked based on the traditional measures.

The results also present that for 3-year time-period of investment, ABG and BTP are ranked No. 1 amongst the top ten best performers analyzed by each performance evaluation measure. These open-ended funds were managed by the Aberdeen Asset Management Co., Ltd. and BBL Asset Management Co., Ltd consecutively. The relationships between the DEA method and the Jensen's alpha and Theynor ratio are closer, compared to that between the DEA technique and the Sharpe ratio. Nevertheless, Up to 80% of the top ten funds ranked based on the DEA technique are the same funds as those ranked using the traditional measures. These are ABG, ABSC-RMF, BERMF, B-INFRA, BKA, BKA<sub>2</sub>, B-SUB and BTP. Two of them, which are B-INFRA and BKA, are ranked amongst the top ten best performers for 6-month, 1-year and 3-year time-periods of investment; meanwhile BTP is ranked among the top ten best performers for both 1-year and 3-year time-periods of investment.

Table 3 also suggests that for 5-year time-period of investment, ABG and B-INFRA are ranked No. 1 amongst the top ten best performers, as evaluated by each performance assessment measure. These open-ended equity mutual funds were managed by the Aberdeen Asset Management Co., Ltd. and BBL Asset Management Co., Ltd. The provided evidence suggests that in terms of fund rankings, the DEA technique seems closer to the Sharpe and Treynor ratios rather than the Jensen's alpha; however only three from the top ten funds ranked based on the DEA technique are the same funds as those ranked using the traditional approaches. ABG, B-INFRA

and KPLUS are ranked amongst the top ten best performers based on all four different performance methods. B-INFRA is ranked amongst the top ten best performers for 6-month, 1-year, 3-year and 5-year time-periods of investment; meanwhile ABG is ranked amongst the top ten best performers for 3-year and 5-year time-periods of investment.

When the performance indexes of all open-ended equity mutual funds are ranked based on the four different measures, the further analyses suggest that the top five funds out-perform the bottom five funds between 0.1912 and 1.3187, for the investigations of six different time-periods of investment, during 1-month and 5-year. These average out-performances are 1.3187 (1-month); 0.6938 (3-month); 0.3219 (6-month); 0.2008 (1-year); 0.2783 (3-year) and 0.1912 (5-year), respectively. By comparison, the first ranked fund has greater performance than the market approximately 0.1140; 0.2576; 0.0608; 0.0553; 0.0467 and 0.0381, consecutively. Notice that the interesting time-period of investment would be between 1-month and 3-month; however, the latter one is the best investment horizon because of the significance of the funds' positive performance.

In summary, the study shows that Thai open-ended equity mutual funds having the best performances compared to the market, as evaluated based on the Treynor ratio, Sharpe ratio, Jensen's alpha, and DEA score are those managed by the Aberdeen Asset Management Co., Ltd. and SCB Asset Management Co., Ltd., for 1-month time-period, and the Aberdeen Asset Management Co., Ltd. and BBL Asset Management Co., Ltd., for the remaining time-periods of investment. Specifically, there are 15, 6 and 3 (repeated) funds were managed by the Aberdeen Asset Management Co., Ltd., BBL Asset Management Co., Ltd. and SCB Asset Management Co., Ltd. respectively.

## Conclusion

The results show that on average, the performances of Thai open-ended equity mutual funds significantly out-perform the market for all time-periods of investment, when measured using the traditional measures. There is evidence presenting the persistency of these positive performances. Thus, the results are accordance with those reported by most past studies on

developed and emerging markets. However, when the DEA technique is also used, the analyses of the comparison results suggest that different methods give different outcomes, due to low correlation between the traditional measures and the DEA technique. Nevertheless, it can be concluded that Thai open-ended equity mutual funds analyzed in this study significantly out-perform the market, and the funds' positive performance persists for 3-month time-period of investment, at least.

In terms of fund ranking assessment, performances evaluated using the traditional measures give more similar rankings compared to those applying the DEA technique; perhaps because the traditional fund performance evaluation methods are based on mean-variance theory (also see [8] and [52]). The results suggest that between 1-month and 1-year time-periods of investment, approximately 50%-60% of the top ten best performers are the same funds, when ranked based on both the traditional and the DEA measures. For the remaining time-periods of investment analyzed in this study, there are up to 80% and about 30% of the top ten best performing funds are the same funds. These funds were managed by the Aberdeen Asset Management Co., Ltd., BBL Asset Management Co., Ltd. and SCB Asset Management Co., Ltd. consecutively.

The further analyses suggest that the top five and bottom five ranked funds have different performances between 0.1912 and 1.3187, for six different investment horizons from 1-month to 5-year. Meanwhile, the average outstanding performance between the first ranked fund and the market is between 0.0381 and 0.2576. Three-month is the best time-period of investment due to the significance of the funds' positive performance.

Additionally, the study provides evidence indicating that the DEA technique can be efficient supplementary tool to assist investors in selecting appropriate funds, particularly in the sense of robustness check. The study also confirms that the DEA technique is an interesting evaluation method selected to be used as an alternative funds' performance measure other than the three traditional measures. If investors use only the traditional measures, perhaps they may miss their investment opportunities (also see [51]).

This is the first comprehensive study focusing on open-ended equity mutual funds in Thailand. The study investigates funds' performances covering six different investment horizons by using several more metrics. These include the traditional measures, DEA technique and Pearson's correlation coefficients. As a result, this study leads more variety of outcomes and comparison with other markets, and finally, contributes to the area of financial economics providing results that can be guidelines for individual investors for selecting mutual funds.

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## Pilot Study on Evaluation Gap between Competencies Acquired by Economic Education Graduates and Requirements of Pitesti Employers

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*This work aimed to assess the gaps between competencies and skills of economic education graduates and the requirements of employers' skills and abilities of Pitesti, the identification of these gaps' causes, and of viable solutions to eliminate the identified gaps. Therefore, the paper presents the results of a pilot study based on two empirical research, one conducted at the level of a sample of final year students from the Faculty of Economics, from University of Pitesti and one conducted on a group sample from Pitesti based-companies. The research results support the hypothesis from which we started, namely that there are differences of perception between prospective employees and employers. It is interesting that both prospective employees and employers consider that practical training is lower than expected.*

**Keywords:** economic higher education, labor market, gaps, causes, solutions

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Many Romanian employers consider that there is an obvious gap between the Romanian education system offer and the labor market requirements. One of this discrepancy's reasons is the transition of Romanian economy towards knowledge-based economy, labor market evolving faster than the educational system. As long as new activities

develop (trend enhanced by increasing the participation of Romanian companies entering the global market and a growing number of large multinational companies on the Romanian market), new jobs obviously require new competences and skills. Providing “specialists” according to the labor market needs is one of universities’ features, and according to the EU standards, each university should have one career consultant to guide students on their future career path. Ecaterina Andronescu argues that in order to ensure this guiding, there is necessary an education marketing system, although due to labor market dynamic character relevant results are very difficult to obtain. She also emphasizes that educational system needs time to create specialists. “It is relatively easy to increase the number of students when you identify a clear requirement on the labor market, but you have to take into account that this specialist will be part of the labor market in 4 or 5 years”. However, according to the employers the current gap between the higher education system and labor market is not necessary a quantitative one. According to employers, in essence, the gap between higher education and the labor market is a qualitative one, not necessarily quantitative. Their comments bind the orientation link education to the accumulation of knowledge, rather than to acquire essential skills for any company, from communication skills to analytical thinking, problem solving and teamwork.

According to Ruxandra Stoian, HR Manager at PricewaterhouseCoopers, due to this gap there is among youngsters a changing attitude towards learning. Arguing that there is a lack of practical applicability in their studies, students tend not to comply with educational requirements, treating them superficially. In this context, they graduate without many of those competences required on the labor market, which education system is not able to provide, as well as major gaps in generic economic education. This aspect is also favored by education system difficulty in keeping up with performance standards. Consequently, employers lose quality, time and money to train people. Academic education is still a matter of status for many students, although what remains after the few years of study will not help them in a job.

While Western Europe companies seeking for new employees will closely check the graduate’s study branch and registration document, the local market companies that do not have a landmark in the Romanian

educational system tend to evaluate previous work experience of the potential candidate. Lately, more employers understood that cooperation with academic system can be helpful thus, many partnerships with universities occurred. On the other hand, there are universities' initiatives inviting professionals from the business area to participate in the educational process. Such initiatives bring to academic environment the necessary knowledge and practical education that support students and let them see the real image of employers (Ruxandra Stoian, 2008). Also, there is initiative from universities, which invite professionals to participate in the educational process. Such projects have the advantage that really bring in universities the necessary practical knowledge that help young people, on one hand, and unsure the promoting of employers image among students, on the other hand (Ruxandra Stoian). Another aspect would be a more intense implication of the employers in such projects, eventually through professional associations, and a more rigorous planning of these projects on medium and long term, so that universities can receive a feedback from the labour market in terms of future professional needs and to prepare certain specialization aligning the curriculum program with labor market needs.

All these debates and differences of opinions led to the establishment of the research question that generated this pilot study: To what extent there is such a gap between students and employers' perceptions on the competences and skills acquired by the future employees in the context of transition toward knowledge based economy?

Taking into account that employers state more often that education is not achieved by coordinating with the requirements of the market and their real needs, through this study we aimed to assess the size of the gap between competence and skills of graduates and employers' requirements in this regard and also to identify the underlying causes of this gap.

## **Literature review**

The academic environment through the activities it carries and through the role that it plays in society is set up as a form of response to the need for specialists. A good academic functioning influence the functioning of society, as the functional society support the effort of universities to create specialists, true professional and social values. In recent years,

universities in Romania have focused more on professional training for students because, on the one hand there was an influx of young people who wanted to traverse the path of education as a guarantee to increase the chances of occupying a certain position in an organization, and on the other hand, financial resources for basic research fell. Nowadays the university has to learn the students with the tools and scientific methods of work, to cultivate their interest in using them creatively to solve specific situations of the economic environment. The literature defines the professional training as a learning process during which participants learn the theoretical and practical knowledge necessary to develop activities and this is measured in terms of skills acquired and the results obtained by involving them in the good of society.

Nowadays, advanced knowledge and skills of individuals, as results of learning, are critical determinants of a country's economic growth because it materializes in an increased efficiency of goods and services production, in a more efficient public sector, a stronger civil society and a more favorable investment climate (World Bank, 2001). The problem of individual skills and competencies required by the knowledge-based economy is a vast field in which the process of defining the concept has not yet been finalized. OECD in *The Knowledge-Based Economy* (Paris, 1996) defines the knowledge-based economy as "the economy based directly on the production, distribution and use of knowledge and information". The key component of the knowledge-based economy is the increased attention given to intellectual qualities, at the individual level, and research and development activities at the firm level, in the detriment of confidence in the employee physical ability or natural resources. In a prosaic way, Ian Brinkley (2006) defines knowledge-based economy as a situation obtained when the companies provide a favorable climate for the well-educated staff and the high technology in order to create wealth.

Communication, cooperation and interpersonal relationship management skills are essential for a person working in the knowledge-based economy (Houghton and Sheehan, 2000), but they do not have to be limited to issues of social interaction in heterogeneous groups. Carrying self-autonomously activities and the interactive use of sciences or humanities specific tools also represents important individual skills in the knowledge-based economy (Trier, 2002). According to a study of the

Organization for Economic Cooperation and Development, the effective participation in the knowledge-based economy requires the following competencies (OECD, 2001): interpersonal skills (teamwork, ability to work together to achieve common goals and leadership and coordination skills), intra-personal skills (motivating attitude, learning ability, problem-solving ability, communication skills, analytical skills), skills to use technology.

Many specialized studies made in this area have succeeded to capture the specific skills that employers expect to provide higher education graduates: the ability to engage in self-directed learning, the desire and ability to take the initiative and responsibility, the higher order thinking, the high level of flexibility and adaptability (Arnold and Mackenzie, 1992, Stevens and Campion, 1994 Bills, 1998, Levenson, 2006). In the particular situation of economic education, several researchers have shown that besides technical skills, graduates need to develop personal skills that will facilitate the success in professional careers (Deppe and others, 1991; Watty and others, 1998; Agyemang and Unerman, 1998, Cleary and others 2007, Wells and others, 2009).

To this purpose, Miller (2000) or Elliott and Jacobson (2002) suggest that economic education students must have a multidisciplinary curriculum that will give them the opportunity to be engaged in processes of learning and to develop the critical and creative thinking. On the other hand, some specialists have pointed that the guarantee by the universities to acquire required skills generic necessary for graduates to meet all the requirements of employers, especially for certain specialties, is an unrealistic approach (Clancey and Ballard, 1995; Cranmer, 2006). However, the higher educational system should focus both on the specific skills forming and the development of graduates' ability to form their own new skills and knowledge throughout life (Duke, 2002).

According to the evaluations made by the economic students about their career prospects, the most important outcomes of learning process should be the development of skills in communication and teamwork (Gabric and McFadden, 2001). The results of these evaluations are direct consequences of the trends in labor market for economists: employers are seeking graduates who have well developed skills in communication, teamwork and problem solving (AC Neilson Research Services, 2000).

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## Research methodology

For data collecting, we used the survey (interview face-to-face and online). The questionnaire used in order to measure the competences and skill acquired by students contained 16 closed questions. In order to measure the competences and skills that students consider they have acquired over years of study, we used a Likert scale with 5 steps. The questionnaire that has been applied to the level of companies' sample contained 18 questions, 16 closed and 2 open. In order to measure the competencies and skills that employers considered to be achieved by economic graduates, we used, also a Likert scale with five steps.

Data were collected at a sample of 100 students from in final year, from different economic programs. Building the sample was done using proportional stratified random sampling. Also, data were collected at a sample of 30 companies, and its structure was: 14 companies in wholesale, retail, repair of motor vehicles and personal and household goods, 5 companies in the real estate, rentals and services, 4 companies in manufacturing, 3 companies in constructions and 2 companies in hotels and restaurants. The companies included in the sample were selected through a filter question. Thus, all companies included in the sample have employed economic graduates of Economic Education, University of Pitesti, in the last three years. The respondents were Human Resources managers or general managers of the companies included in the sample.

However, the perceptions of graduates in Economics and employers for the skills needed for a career are often different. In a study conducted in 1993, Kim, Ghosh and Meng show that the most important selection criteria used by employers for graduates in Economics are: the motivation or interest of graduates for jobs available, personal qualities and communication skills. Instead, graduates consider that employers are more interested in the expertise acquired. A similar study reveals that both students and employers have placed on top the verbal communication and understanding and problem solving skills, but there are different perceptions about the importance of other skills (Leveson, 2000). Results of more recent research indicate that there are similar views between students and employers about the skills needed for success in a business career. Thus, they consider very important the analytical and communication skills and

lifelong learning ability, but the assigned positions are different according to the specialty of interviewed students and the field activity of the employer (Kavanagh and Drennan 2008).

In Romania, according to the National Qualifications Framework for Higher Education created by Ministry of Education, Research and Innovation Order No 4430/2009 as a unique tool that ensures the international compatibility of qualifications acquired in the higher education system based on objectives set in the European Union by the Strategy Lisbon and Bologna process, the graduates' skills fall into two categories:

- professional skills: the proven ability to select, combine and use adequately knowledge, skills, values, attitudes in solving a particular category of learning situations and which is expressed through knowledge, understanding and use of the specific language, explanation and interpretation, application, transfer and problem solving, critical and constructive reflection, creativity and innovation;
- transversal skills that represent value and attitudinal acquisitions that transcend a particular field having a cross-disciplinary nature and consist in teamwork skills, oral and written communication skills in their mother tongue/foreign, the use of the information and communication technology, the problem solving and decision making, the recognition and respect for diversity and multiculturalism, the autonomy of learning, the initiative and entrepreneurship, the opening to lifelong learning, the respecting and developing professional values and ethics.

In our country, the controversy about the quality of higher education has also generated numerous studies that evaluated, among others, the employers and students' perceptions regarding the university education. Romanian Agency for Quality Assurance in Higher Education in 2009 published the report of an extensive research on the status of the academic quality in Romanian higher education system, which shows the existence of a gap in perception on the graduate profile provided by the universities. According to employers, the first 5 knowledge and skills that a graduate should have are: the ability to organize at work, the ability to work in a team, the ability to communicate, the punctuality and the morality. In

the perception of students, the hierarchy of most important knowledge and skills are: the ability to synthesize the information received the analytical thinking, the teamwork ability, the ability to organize at work and the critical thinking.

According to employers, there are three central factors in the selection and employment of graduates: the university reputation of the graduate, the work history (the graduate experience) and the candidate's ability to "sell" himself during the interview. Therefore, the main issues followed by employers from a graduate are poorly related to the preparation obtained during college. In the particular case of higher economic education graduates, employers appreciate, with predilection, the following competencies of graduates: the concern for the quality of the work, knowledge of foreign languages, skills in using computer systems, the ability to work in a team and the ability to implement the expertise (Vasiliu, 2009). Romanian employers' requests regarding to the skills of higher education graduates are not significantly different from those of employers in the European Union countries. A study made by "Gallup Organization" at the request of the Directorate General for Education and Culture of the European Commission in 2010, shows that most European employers consider very important the following competencies: the ability to work together, professional skills, communication skills, computer skills and the ability to adapt to new situations / contingencies.

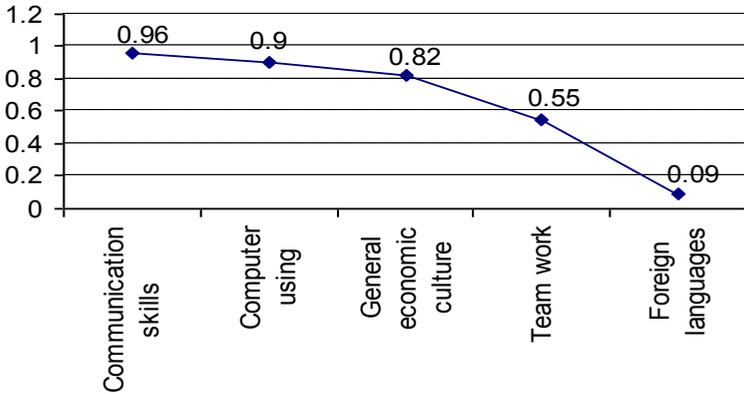
The gaps between the perceptions of Romanian students and employers regarding the skills necessary to practice in certain quality standards are generated, in part, by the lack of employers' interest to graduates of lifelong learning skills, even if, as Vasile, Prelipcean and Şandru (2009) observed, in the context of knowledge-based economy, the life cycle of knowledge and skills learned / acquired by the students is relatively short.

## **Analysis and interpretation of the results**

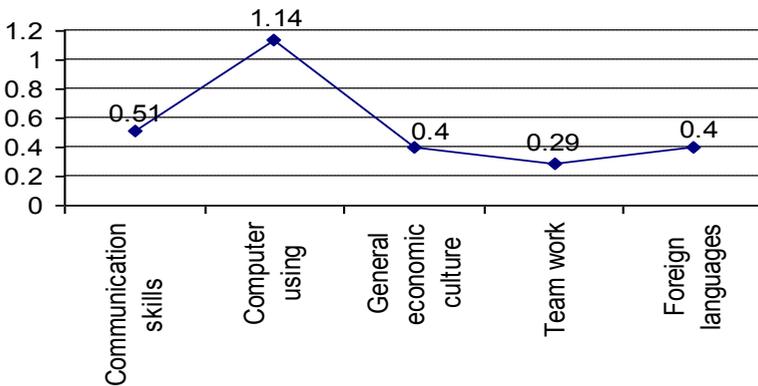
Regarding the assessment of perceptions over the types of skills and abilities acquired by students at both students and employers in the survey results reveals some differences. Students consider they have acquired mainly during the approximately three years of study: communication skills (overall score +0.96), followed by knowledge computer (overall score + 0.9),

knowledge of general economic culture (overall score + 0.82), and teamwork abilities (overall score + 0.55), and foreign language knowledge (overall score +0.09). Based on experience, Pitesti employers consider that graduates of the Faculty of Economics, University of Pitesti, have acquired mainly computer knowledge (overall score +1.14), followed by communication skills (overall score +0.51), general culture knowledge and foreign languages (overall score +0.4), and considered that they have acquired to a lesser extent teamwork abilities (overall score +0.29).

**Students general score**



**Companies general score**



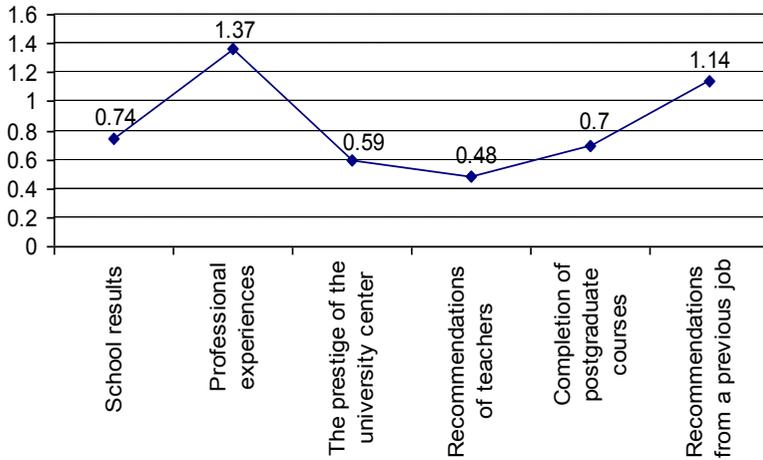
It is interesting that regarding computer use, employers have a better perception than the students about their knowledge acquired in this field. Otherwise all measured directions we can notice that students have a better perception of their skills and abilities than employers. The biggest differences of perception are related to the communication skills and teamwork abilities, students having a better opinion about their competences acquired in these directions. An explanation of the fact that students are not adequately prepared in terms of communication and teamwork is that in teaching process are not used modern methods (for instance, simulations, role plays) and the fact that the teaching process don't focus on free presentations that stimulate spontaneity, on team projects that should be presented by students which would have to develop creative and analytical thinking, communicational skills. In terms of assessing the relationship between theoretical knowledge and practical skills acquired by graduates of the Faculty of Economics, University of Pitesti, the results of research emphasis no relevant differences between the perceptions of students and employers. However, these results show that both students and employers consider that there is not a balance between theoretical and practical knowledge acquired by students during the three years of study. This imbalance can be explained by the results concerning the theoretical and practical knowledge acquired by students. Thus, in terms of theoretical knowledge, both students and employers are relatively similar in assessments (students generally score +0.79, +0.85 employers overall score), but the results for practical knowledge (students overall score -0.78, -0.66 employers overall score) reveal that both employers and especially students consider it insufficient.

An interesting aspect is that employers have a significantly better perception than the students about their theoretical knowledge. Another interesting aspect emerged from the research is that students who held a job during the three years of study have a closer view of the employers, in terms of practical knowledge (-0.64). Students also believe that many subjects studied during the three years of study are not compatible with the requirements of competence necessary for a job, overall score for this question was -0.29. However, the results showed that students who had a job during the last three years had a better appreciation of most subjects studied (overall score +0.02) than those who did not have a job (overall

score -0.15). This result can be explained by the fact that students that had a job were in a better position to make an objective assessment for the importance of subjects studied, as long as they had the possibility to practice the theoretical knowledge acquired.

Regarding the importance of extracurricular activities during the three years of study in the development of competencies needed to access a job, results reveal that most students (82%) did not participated in any extracurricular activity, while only 13% have participated in scientific sessions, 2% in the activities of students' organizations, 2% in other activities organized by the university (for instance, competitions in partnership with the university) and 1% to other types of activities. These results show a contradictory situation because students believe that extracurricular activities are very important in development of skills and abilities necessary to access a job (overall score +0.54). Frequency degree can't be an explication of the absenteeism of students in extracurricular activities because 51% of respondents had a very high degree of frequency, 30% of them had a high frequency and 18% a medium frequency. A possible explanation may be the fact that students are reluctant to participate in activities on their own initiative, without extrinsic motivation. Also, the faculty is not promoting such events sufficiently and the benefits of the participation in such activities, that these are organized in order to help students to develop their teamwork skills, communication abilities, analytical thinking, and practical skills.

Regarding the importance of the criteria used in hiring graduates by the surveyed organizations, employers attach the utmost importance to professional experience (overall score +1.37) and recommendations from a previous job (overall score +1.14), followed by school results (overall score +0.74), completion of the education (overall score +0.70), the prestige of the university (overall score +0.59), recommendations of teachers from the university completed by the applicant (overall score +0.48).



These results underline, once again, that the employers put more emphasis on practical training of candidates, which should be taken into account when carrying out the practice of students, and the university curricula. It can be also noticed that the reputation of the university in which the candidate graduated is a less important criterion in this hierarchy, which confirms that in the absence of a clear hierarchy of Romanian universities, employers do not have any mark in this sense; therefore the prestige of the university is a less important criterion in the candidates selection process, the prestige being more a subjective evaluation that each employer makes based on own experience. Last but not least, it is noted that the last criterion in the employers' hierarchy is teachers' recommendations. This also emphasis the employers luck of thrust in academic environment.

## Conclusions

As expected, the research results have highlighted that in the perceptions between students and employers about the competencies and skills for economic education graduates there are some gaps. This is not a novelty, being a highly debated issue in the Romanian society in recent years. Interesting are the results of research revealed by the following: (1) employers recognize that economic education graduates in the position of

candidates who have visited a job, have a pretty solid theoretical view that they excel in what concerns, for example, computer use, (2) However, they consider that, in terms of pragmatism that the implementation in practice the theoretical knowledge acquired companies, economic education graduates have major problems. Therefore, these graduates are not immediately productive, requiring additional training period to become productive, (3) from this point of view, there is unanimity in perceptions about students having the same perception of their practical training.

The causes underlying the existence of these gaps are multiples, in many occasions being highlighted by members of the academic community, especially by the employers. From our point of view, they should be analyzed from the relationship: Institutions of Higher Education - Employers - Government.

Employers, for example, have too high expectations in terms of "immediate productivity" of graduates, neglecting two important aspects: (a) the need for skills by the students during academic training, the skills of 'lifelong learning' that will be more useful in your professional career (long term) than the immediate practical application skills of the theoretical knowledge, (2) graduates need training in specific corporate culture.

From our point of view, the fact that the graduate has the ability to learn and adapt quickly in the context of a job, it represent valuable skills, namely, the premise of a human resources able to adapt to a dynamic environment, constantly changing. Given the new type of environment in which firms operate - volatile and uncertain - they put an increasing emphasis on multi-skills employees. The fact that economic education graduates have a solid overall economic training, this represents the prerequisite for their rapid adaptation to a cross-functional environment. Last but not least, rapid environmental changes require that employees of a company to acquire new skills and competencies continuously. Therefore, we believe that the expectations of employers in this regard, are partly justified, given that many neglect this important aspect - training which is in direct relationship with companies' ability to adapt to the demands of business environment changing.

On the other hand, the lack of openness of the business environment for collaboration with academic environment, and the existence of prejudices, which lead to their lack of confidence in the

institution of higher education, represent another cause of these differences. We believe that employers' point of view is partially justified. Without trying such collaboration, the employers label this aspect as being counterproductive and ineffective results. However, higher education institution is a provider of valuable manpower. We believe that companies, in collaboration with academia, would be able to recruit future employees, which ever since the student will be trained in company culture and become productive more quickly when hiring.

Regarding higher education institution, it certainly must be more open to market demands and requirements of employers. Obviously, there must be a shift from emphasis on the theoretical to the practical training. We believe that this can be done firstly by increasing pragmatism and foster collaboration with business teachers. As an old Chinese proverb says: "Tell me and I will forget, show me and maybe I will retain, ask me do and I have to learn", experience in business theorists would reduce the gap between academics and practitioners. This would reflect on teachers' teaching, which could turn back the theory and practice report as required by employers. Finally, the use of modern teaching methods such as simulations, role-plays, simulated enterprises anticipate this.

Regarding the role of government, it should create the legal framework to stimulate the above issues, namely public-private partnership. Incentives to employers who sign contracts for work carried out between students from professional internship would be a useful measure for preventing situations in which activity is more specialized practice a formality.

Developing the education and professional training of students and increasing the competitiveness of the capital socio-professional integration of rapid labor market flexible, modern and inclusive, in our view, it can be done, on the one hand by work on the direct relationship student and future graduate employer, on the other hand, actions designed to facilitate better anchoring scholars in the field of strategic and managerial issues of economic agents and the local community. We present some proposals in this regard:

- Development of guidance and counseling activities of students in order to better correlations of supply and demand (academic

environment, students, graduates) as a prerequisite for increasing the absorption of graduates into the labor market;

- Students' awareness of individual need career circumscribed to the general and particular framework of the job requested by every graduate and the necessity of knowledge and understanding of firms employing high expectations and standards. This can be achieved by holding meetings with representatives of the business (human resources managers, top management) to help students better understand the necessity of acquiring knowledge and practicing skills and competencies, attracting specialist practitioners in teaching certain topics;
- Developing collaborative relationships between academics and potential employers in order to improve programs for students workplace learning. This is possible by involvement of guardians appointed for coordination of the students specialized, by law, in efforts to identify the profile of skills and abilities for specific job practical training of students of higher education graduates in related economic and guidance on actions and student assessment practices;
- Placing students in practical units taking into account the correlation profile of the job-specialization to whom the student is registered-individual features identified by guidance and counseling activities;
- Stimulate students to become more competitive by implementing human capital and innovative interactive methods of learning such as simulated enterprise;
- Improvement of relations between universities and economic environment, government, NGOs in order to resolve some problems of the Romanian education system related to the improvement of university curricula, the quality of learning, career guidance and counseling, labor market integration of graduates;
- Transformation of universities in systems capable of reaching a high economic, administrative level of integration, in order to respond effectively to the challenges of the knowledge society;

- Awareness of the importance of economic cooperation with the academic programs and promote common practices related to student;
- Identifying operators who show openness to collaboration with academia and initiate actions where students are primarily involved in, especially on line documentation for the preparation of license and dissertation work which has as its theme issues designed to lead to improvement performance of partner organizations;
- Supporting operators in recruitment activity through the establishment and operationalization of a database on individual capabilities of students that graduate with the Centers for career guidance and counseling shall be provided in the liaison between universities, student organizations and business;
- Involvement of academics in voluntary actions aimed at providing solutions on improving their internal environment by providing them an offer of research topics of interest to the business environment, in their solving students being involved and then to materialize in contracts;
- Initiation of projects by business associations, together with guidance and counseling centers in university career (company presentations, mock interviews, job fairs, internships paid, etc.) to facilitate interaction of students with employers in order to fully understand the requirements of the labor market where they are to integrate;
- Identification with the support of NGOs ways to collaborate with academic staff, the economic environment to enable flexible curriculum content in relation to the dynamic labor market demands and to maintain permanent contact with the practical side of theoretical training of specialists.

## **Limits of research and future research directions**

The most important limit of this research comes from the fact that the sample size is not representative, results cannot be extended nationwide. But, as we emphasized, this is a pilot study, its results can be interpreted only in this context. Therefore, we propose that in the future to

expand this research in two directions: (1) to improve the two measuring instruments used by adding additional variables, namely to increase the number of skills and abilities assessed, (2) to extend the measurement nationally.

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## Forest Protection and Climate Change – Integrated Approach through Market Based Mechanisms

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*Currently it is unfolding the United Nations International Year for Forests. This underlines the recognition of forests importance for the contemporary and future society and envisages raising awareness on several aspects to be considered by the variety of stakeholders for forestry. Meanwhile, the rate of deforestation halted its increase although remain high with more than ten million tropical forest being destroyed in each year. Deforestation economics is more than explanatory in this respect and supportive for urgent and effective policy action that could improve incentives for sustainable forest management instead of conversion or logging. REDD+ is among the latest and most challenging policy tools developed within a global approach addressing both climate change and forest protection in an integrated manner underpinned by the convergence of interests in these two major environmental areas. The paper envisages to explain the interdependencies and to highlight progresses made in implementation.*

**Keywords:** climate change, forests, ecosystem services, REDD+

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Forests importance for the wellbeing of humans is hardly questionable. Nevertheless, the loss of forest cover heads the environmental agenda for decades. This paradox suggests that despite significant progresses in the theory and practice of forest management and environmental protection a number of pressures are not properly addressed. The currently unfolding International Year of Forests (IYF) indicates that

the United Nations (UN) recognizes this gap and urges action toward a more effective forest protection.

Climate change is another broadly recognized environmental issue that is to be mitigated for a safe future of humans. Again, we are facing a dilemma: more than a decade of specific policy action has little chance to enforce the changes needed for accomplishing emission reduction targets. Moreover, the post-Kyoto climate policy outlook is biased by sterile negotiations [1] with key players that are reluctant to assume clear commitments for emission reductions.

At this point, it should be emphasized that environmental issues are not discrete, they being outlined for management purposes that seek effectiveness. Thus, the above-mentioned issues are interwoven and wise policy design could harness the interdependencies and improve both the progress in climate change mitigation and forest protection. This specific area is to be explored by our paper, which will discuss deforestation economics, the ecosystem service perspective and its implication for forest management, eventually focusing on the policy mechanism developed in this area at global level: Reducing Emissions from Deforestation and forest Degradation (REDD+). Thus, it will be created a comprehensive and explanatory picture on how forest protection is an important climate change mitigation tool.

## **Global forest resources**

The state of forest resources is subject of an intense monitoring effort, which provides periodically reports on various indicators and their trends. According to the latest assessments [2], the total area of forest-covered land is about four billion hectares representing around one third of the total land area. For each inhabitant of the Earth corresponds 0.6 hectares of forest. Five of the forest rich countries (the Russian Federation, Brazil, Canada, the United States of America and China) account for more than half of the forest area.

Deforestation is occurring for a variety of reasons depending on the interplays of economic and social factors at local level, but also as a result of the global interactions. Rate of deforestation halted its increase, but it remains to high to be considered acceptable. The annual forest loss was of 13

million hectares in the last decade being lower compared to the previous decade (16 million hectares per year). Brazil and Indonesia recorded important reductions in deforestation rates, while in Australia severe drought and wildfires increased the rate of loss. Nevertheless, the effect of forestry and environmental policies are burgeoning in an increase of a forestation rate, which reduces the net loss of forest to 5.2 hectares annually.

The world's forests stock 289 Giga tones of carbon and it is estimated that due to the reduction of global forest area this stock is decreasing with 0.5 Giga tones annually. From the total forest area, 36% is represented by primary forests (forest of native species where there are no clearly visible indications of human activities and the ecological processes have not been significantly disturbed). These forests are the most important in terms of biodiversity preservation with the bulk of the contribution in case of tropical moist forests. Planted forests area is increasing and represents 7% of the forest cover (264 million hectares). Most of this increase is determined by afforesting efforts in China. Three-quarters of all planted forests consist of native species while one-quarter comprises introduced species.

Forests that are primarily designated for biodiversity protection account for 12% of the total area and are increasing. Productive forests represent 30% and provide wood and non-wood forest products. The annual wood removal is of 3.4 billion cubic meter equivalent of 0.7% of the total growing stock. Its value, estimated on the base of industrial round wood, is about US\$ 100 billion. This figure could be higher if a fuel wood removal could be more precisely measured. Protective forests represent 8% of the total and are used for soil and water conservation, avalanche control, sand dune stabilization, desertification control or coastal protection.

## **Deforestation economics**

Forests are ecosystems that played an important role in the economic arena for centuries. This role was shaped mainly by the main products to be harvested from forests: wood, fur, fruits, fish, medicine plants etc. Forests were maintained in order to secure these products as long as opportunity costs from other options remained below the benefits obtained from selling them. Increasing population resulted in a higher food demand, which in

case of small improvements agricultural techniques in terms of productivity and converted more and more forested land to crop land. Additional pressures aroused then the exchange value of some products increased sharply. For instance, at certain moment the value of wool was high enough to deforest almost entirely the territory of the United Kingdom in order to give room for pastures. Although this occurred in a historical timeframe that is quite different the patterns could be easily recognized in many developing countries today.

In essence, deforestation economics is very simple. The value of harvested wood added or not with the value of benefits gained from land conversion is exceeding by far the value of benefits obtained by sustainable forest management. This fact is the basic explanation for the high rate of deforestation. The issue is complicated if ownership is considered and distributional effects explored. Thus, the benefits of deforestation could be high, but the largest share is not harnessed by proprietors. Nevertheless, this does not prevent these pressure factors to occur. More detailed insights on deforestation economics are as follows [3]:

- Higher prices for farm output induce forest conversion and benefit farmers;
- Richer farmers are better able to finance deforestation;
- Good land is cleared first;
- Higher off-farm wages discourage deforestation in marginal areas;
- Agricultural technology promotes growth with implications for deforestation;
- Roads provide the path to rural development - and forest clearance;
- Tenure is good for landholders, but has uncertain effects for deforestation. It guarantees benefits for the right holders, whatever it is;
- Higher timber prices put pressure on old-growth forests, but create incentives for new ones only when tenure is clear for long-term gains;
- Sustainable timber management is often less lucrative than other options;
- In old-growth rainforests with diverse, slow-growing species, biological diversity and financial considerations could push landholders away from sustainability;

- Even low-return pasture or staple crops offer higher returns to landholders;
- The value of harvested wood per hectare equals a CEO salary for a year in temperate forests.

If no other factors interfere, these facts create incentives for a deforestation rate that is beyond forests' regeneration capacity. Preventing such situation is the main purpose of forest policy, which is enforced by using a variety of tools. Traditionally, regulation and state ownership are the most widespread instruments of forest policy. The current state of forest, with high rates of deforestation, illegal logging and corruption within empowered institutions indicate that other approaches need to be considered for improving forest protection.

## **Ecosystem service – a concept to foster economic approaches in ecosystem management**

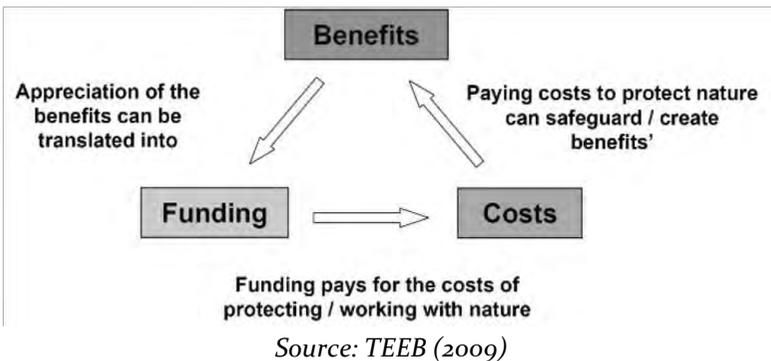
The recent emphasis on the economic dimension of environmental issues is most easily to be noticed in case of nature conservation or fight against biodiversity loss. In this area, in no more than a decade a concept was advanced, checked, debated, and up taken in policy framework. This concept is ecosystem service and is defined as benefits obtained by humans from ecosystems. These include providing, regulation, support, and cultural services [4]. Although it was proposed in the very early age of environmentalism, it becomes a subject of intensive research only in the late 1990s.

Today, ecosystem service is a common place in the policy documents. Projects like Millennium Ecosystem Assessment, TEEB (The Economics of Ecosystems and Biodiversity), and GEM-CON-BIO (Governance and ecosystems management for the conservation of biodiversity) had an important contribution in this respect. The concept reflects a quite obsolete anthropocentric nature-human mind map, which is based on the perception that the value of nature reflects only its utility. Despite the theoretical basis, there are already great expectations to create markets for the ecosystem services.

## Reducing Emissions from Deforestation and forest Degradation (REDD+)

According to the one of the earliest and also most comprehensive definition, payments for ecosystem services (PES) are represented by any arrangements through which the beneficiaries of ecosystem services pay the providers of those services. The PES could be enforced for single or multiple services. The most common PES target water quality, carbon sequestration, removal of invasive species, and biodiversity protection.

PES rational is quite simple. It is based on the need for funding for protection of ecosystems and for biodiversity preservation. This funding is justified as a contribution to social goals that will bring in benefits. If benefits are to be produced on the behalf of the society then society has to pay for them. Since not all social actors share equal benefits from ecosystem services it worth to identify the ones who do so and create a mechanism that allows them to pay. Their payment will produce the funds needed for protection (fig.1).



**Figure 1:** Funding the provision of ecosystem services

PES varies in the scale of application too. The project to Reduce Emissions from Deforestation and Forest Degradation (REDD) was designed at global level as part of the post 2012-regime for climate change mitigation. Its contribution was estimated to 18-20% greenhouse gas emission reduction from tropical deforestation and related land-use change. Other PES are applied only on local scale (e.g. northern Ecuador for water quality).

Considering the level of governmental implication, most of PES depend on such arrangements. Nevertheless, there are PES based only on private agreements. The implication of non-governmental organizations is welcomed in this area too.

PES are applied in different forms in many countries by using national and regional systems. Among the most prominent systems there are the ones implemented in Costa Rica, Japan and France.

In Costa Rica a national system of payments for environmental services was implemented in 1997. The services to be rewarded are carbon sequestration, watershed protection, biodiversity and landscape preservation. The system cover a 640 000 hectares area of forest and forestry plantations which is owned by 8 000 proprietors.

The scheme comprised a direct payment of 64 USD/ha/year or an 816 USD/ha/10 years. The funds to cover these payments are represented by grants from the World Bank, Global Environmental Facilities, the German Aid agency, but they are also gathered by the fossil fuel tax. Further, individual agreements with water users completed the financial resources. The carbon finance it is also envisaged as a potential revenue source for the fund.

The scheme has very positive assessments. Nevertheless, there is criticism related to its effective contribution in lowering the path of deforestation. It is argued that other factors had more important contributions.

The scheme implemented in Japan was initiated by the Kochi Prefecture in 2003. It is designed as “forest environmental tax” or “water and green forest management tax”. Each prefecture levies a 5-10 USD per inhabitant and 100-800 USD per business to fund restoration and enhancement of forest ecosystem services (excluding timber production). An important feature is that forest owners are rewarded only then the effort is proved – after at least ten years.

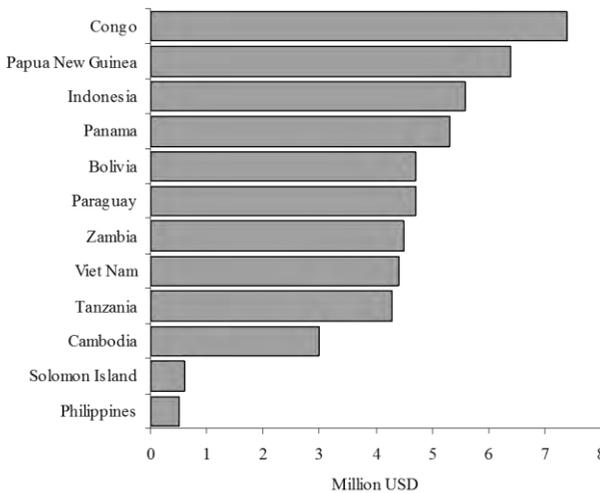
REDD is a program proposed by the United Nations that aims to fight climate change, but along with this broad goal there are also pursued biodiversity and poverty reduction targets in developing countries. The program is underpinned by the fact that in these countries deforestation is the main source of greenhouse gas emissions. It intends to use funds from



contribution is allocated for supporting projects in developing countries as approved budgets. Nevertheless, not all this amount is transferred yet, and only around 7 million is the expenditure recorded to date.

Countries that have approved budgets, ordered by the size of this budget (fig.3), are: Democratic Republic Congo, Papua New Guinea, Indonesia, Panama, Paraguay, Bolivia, Zambia, Viet Nam, Tanzania, Cambodia, Solomon Island, and Philippines. Until now, only in two of the countries were recorded expenditures and these are Congo and Viet Nam.

Since its implementation, REDD was carefully watched by the scientific community which made reports on its implementation progress, potential to bring in benefits, barriers to be overcome, and outcomes.



Source: UN-REDD Programme

**Figure 3:** REDD countries by their budgets

The literature review [5] on the subject revealed the potential benefits, but also the drawbacks of the program. These are the followings:

- Potential benefits:
  - The prospective immediacy of its benefits;
  - Cost-effectiveness, relative to other mitigation options;
  - Support of biodiversity conservation and delivery of other environmental services;

- Contribution to poverty reduction and improved rural livelihoods.
- Potential drawbacks:
  - Implementation arrangements could deny the rights of indigenous and forest-dependent peoples over their territories and resources and prejudice progress towards more decentralized, locally-empowering modes of forest governance. For example, indigenous peoples' agency in REDD+ negotiations remains problematic (Schroeder, 2010), and there is continued disagreement on what constitutes a REDD+ eligible "forest";
  - A focus solely on forest carbon will override concerns about biodiversity conservation, particularly if the definition of "forests" eligible for REDD+ credits does not distinguish between natural forests and plantations and encourages replacement of the former by the latter;
  - The additional feature, leakage, and permanence of forest-based emissions reductions compared to those of other sectors.

The most powerful reason to support REDD is that storing carbon in forest, in addition to its co-benefits in terms of biodiversity preservation and poverty alleviation, could "buy time" to prepare a more comprehensive climate strategy. Such action is needed considering the difficulty in making progress in climate negotiation, case that is illustrated by the happening of the Copenhagen Conference.

## Conclusions

Environmental issues are interwoven in a complex network of interdependencies, which are "decomposed" to a certain extent for improving the effectiveness of mitigation efforts. Nonetheless, there are instance then these interactions could be harnessed for the same management purposes. The paper explored such a case and developed an argument for the integrated approach of forest protection and climate change mitigation.

The state of world forest is far from the one that could be considered sustainable, but there are several areas where significant improvements were achieved: deforestation rate, designation of forests for biodiversity preservation, and compensation of forest cover loss by

plantations. The economics of deforestation reveals that the economic drivers create very powerful incentives, which should be considered more seriously in policymaking. Adopting market-based mechanisms could be an important complement and their design allows and integrated approach that will lead to progress in climate change mitigation too. Thus, the REDD+ program could help both, reduction of net forest loss and climate change mitigation by carbon stocks and emission reduction.

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## Conflict, Contract, Leadership and Innovation: An Interdisciplinary View

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*The competitive market is able to regulate simple innovative processes. In those of a more complex nature whose principal players may belong to either the same or a different firm a different form of organization is required: one which coherently defines rules and resources designed to avoid, in conditions of uncertainty, tensions arising between the different players which prevent their coordination. In this essay, the hypothesis that such organizations require both contract and leadership will be presented and discussed. The contract is required to en-sure ex-post efficiency, avoiding wastage of resources, and ex-ante efficiency, i.e. mutual commitment between the different players in the innovative process. Leadership is required to progressively manage the conflicts that occur between contrasting visions of how best to proceed that emerge from different specializations, legitimized through a shared commitment. Notwithstanding such characterization, leadership may also not assume the same functions of contract. The contract may not be sufficient and require leadership, but strong leadership cannot replace contract. In such a case, there would be a risk of disengagement. An initial application of this simple model (leadership and contract) seems encouraging against competing theories conceiving contract or leadership as sufficient conditions for innovation.*

**Keywords:** leadership, innovation, conflict, contract

**JEL Classification:** O32

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New solutions to existing activity-functionality are followed by application and dissemination within and outside the areas in which they were introduced; related activities change, as do their relationships. Such changes allow new features to come to light. As Abbot Payson Usher pointed out long ago, “Changes in function require new forms, new forms foster further changes in function” (Usher 1929/1988, p. 17). If this happens, the cycle can begin again, but success or failure, times and results are not predictable (Lane, Maxfield, Read and Van der Leeuw 2009, p. 38). The many who design, implement, operate, sell and buy a new product or new operational solution are today acting to close in and “tighten” their coordination. If they are unable to know timeframes and results, all these players struggle to align their different contributions. In fact, it is widely recognized that though each of the innovative processes presents a history and peculiar features that vary according to the contexts, there is a common aspect: the necessary contemporary contribution of various agents and the strong uncertainty. “Innovation processes [...] vary widely according to the firm’s sector and size. Only two innovation processes remain generic: co-ordinating and integrating specialized knowledge, and learning in conditions of uncertainty.” (Pavitt 2003, p. 1). “Let us distinguish between (a) the notion of uncertainty familiar to economic analysis defined in terms of imperfect information about the occurrence of a known list of events and (b) what we could call strong uncertainty whereby the list of possible events is unknown [...]. I suggest that, in general, innovative search is characterized by strong uncertainty.” (Dosi, 1988, p. 1134).

Therefore, appropriate organizational measures are required and special consideration must be given to the spread of articulated organizational forms in order to coordinate the innovation processes. The increase in recent decades in the frequency and significance of changes in products, processes and organizations has not in fact encouraged the rise of vertical integration of firms (Langlois 2003, p. 352, 354), as transactional theory would suggest (Williamson 1991). Instead, the number of agreements for innovation among firms has increased (Hage-doorn 2002, p. 479-480, 490). Evidently, the division of labor has now advanced to such a point that players are often, though not all around (Tokumaru 2006), placed in different companies. These formal agreements demonstrate that coordination cannot be easy if it is unable to take place through

spontaneous and informal cooperative norms (De Jong and Klein Woolthuis 2008, Jennejohn 2008, Gilson, Sabel and Scott 2009).

To summarize, there may be some tension between the different players in the innovation process when, as is the case today, interaction between them is accelerated and there is a strong division of labor. The organizational forms of coordination are articulated and include agreements between independent enterprises. They give rise to several questions about the nature of such tensions and such forms of coordination, which this paper will try to answer by adopting an interdisciplinary view. In the next section, however, a preliminary question arises: if tensions in coordination cannot be excluded then how widespread are they? It will be found that there are cases where such difficulties may be considered absent, when the innovation process is confined within a consolidated knowledge. The competitive market is able to regulate these simple innovative processes.

## **Innovative Systems**

In innovation, as in the invention, application, development and commercial exploitation of new products and production processes as well as organizations, the players contribute in different ways: strategically (resource allocation between current and new activities), technically (research, applications, prototypes, testing, production) and commercially (identification of the market segment, promotion, sales services). The innovation process requires coordinated interaction between all these functions, but they are not ordered in a linear fashion. Innovation does not come from resources devoted to research and development, followed by production, in turn followed by marketing and sales. The process is systemic, full of feedback loops and surprises (Nelson and Winter 1982, Kline and Rosenberg 1986, Freeman 1987). Once a plan has been established, the design of the prototype may take longer than expected, or may require other skills and other facilities: the plan must then be revised. To move from prototype to mass production, engineers must modify the design over and over again and realign resources accordingly. Initial marketing may reveal unexpected difficulties, but also opportunities. Designers must return to the field, but this requires resources and so forth. It is a learning process in which one set of knowledge explores new applications; in the meantime

reality is changing due to the exploration of different knowledge at the same time.

## **Program and experience**

Notwithstanding its complexity, this interactive system is not indecipherable. It can be assumed that its problematic central mechanism is essentially the same when applied in different fields and at different levels. This is the interactive program – experience mechanism (Lynn, Morone and Paulson 1996; Beckman and Barry 2007).

The technical area gives indications that can generally be applied to the various other functions in the innovation processes. It was here that an important contribution was made by Von Hippel and Tire (1995). In a factory producing electronic circuits, an innovation process took place which lasted two years. This consisted in the development and implementation of a Past Profiler and a Pitch and Place System. Several malfunctions were recorded. Five emerged immediately, during installation of the new machines, and were observed and resolved by the designers. Fifteen emerged during use. The designers knew that the machines should have been tested with a greater number of different conditions than was actually the case, and would have conducted these tests were it not for the high costs (Von Hippel and Tire 1995, p. 6, 9-10). In the remaining seven issues, the designers could not do anything in the lab despite having the time and the resources for countless tests. The problems arose because the new machines allowed changes in other parts of the production process which in turn demanded changes to the machines (Von Hippel and Tire 1995, p. 10-11). For example, after the introduction of the Past Profiler and Pitch and Place System, the engineers saw that the uniformity of the points of adhesive paste could be improved by reducing the thickness of the substrate of the plate. However, with a thinner support all the measures of the Past Profiler became unreliable. It was laboriously discovered that the laser beam passed through the plate and the reflective part was insufficient. This required rather significant changes to the machine.

In this example it can be seen that there are two specialized groups: the engineers developing the new machinery and the engineers overseeing the production of the printed circuit board as well as their thickness, holes

and printing. There is specific consolidated knowledge of the two groups capable of innovation such as: design, implementation and laboratory testing of the new machines on the one hand; design, implementation and testing of new plates on the other. Each of these is able to innovate and configure a “module” (consolidated knowledge and a dominant design) similar – at the level of components – to the technological paradigm (Peine 2008, p. 514). Within the confines of a module, there is a first form of learning which can be called application method<sup>1</sup> (AM), i.e. planning, implementation and testing based on that knowledge. This consolidated knowledge evolves also by learning in the process of interaction between the knowledge of the two groups on the field<sup>2</sup>. One reason is that the tests necessary to reveal the errors for all possible operating variations would be too numerous on the basis of a cost-benefit calculation. It is a form of learning that uses consolidated knowledge (method), field applications, and updates of the method (MAM). There is another type of learning in the process, namely self-guided experience (EA), where innovation by one party (the new machines) produces, after being practically applied, opportunities for innovation on the part of another (the new thinner plates) which, in turn, require changes in the machines (interaction). Finally, as will be shortly explained, it is useful to distinguish between structured (Clark 1985), and unstructured EA learning. The uncertainty varies according to the different forms of learning. In AM learning, uncertainty appears as

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<sup>1</sup> The term method, as used here, indicates an explicit and tacit knowledge in the sense of Gurlay (2004) who, elaborating on Polanyi (1966) and Dewey and Bentley (1949), shows that tacit knowledge can be ascribed to a sign-process. In this way Gurlay resolves two problems which have long been disputed: whether the tacit know-ledge is only personal or also of groups and whether or not it is transmissible. A gestural process which is not verbalized is personal, but can be learned through observation, imitation, and experience. Therefore, knowledge, as resulting from interacting verbal and non-verbal processes could be expressed in an operating method, comprising explicit norms and gestural experiences. This will be personal but may be shared as it is not entirely transmissible in formal ways.

<sup>2</sup> According to Kurt Lewin (1890-1947) a “field” is the space within which there are various agents, as well as material elements (agents-artifacts field), that affects the behavior and learning of the same agents and on which these have an influence. Therefore such behavior appears dynamically undetermined (Lewin 1951, p. 240).

calculable risk (Dosi 1988, p. 1130 and 1131; Peine 2008, p. 514); in MAM learning, uncertainty is epistemic (it would be too expensive and time consuming to collect and process all the information necessary to reduce the uncertainty to risk); EA learning is the extreme, where it is impossible to know ex-ante what information should even be collected, and uncertainty is ontological (Lane and Maxfield 2005, p. 10). With regard to tensions in the coordination of different specialized actors, these may be considered absent within a module (AM learning) where the engineers are linked by similar knowledge and experience. In MAM learning, there may be tensions stemming from semantic uncertainty: it may be unclear what exactly the results of applied experience mean. However, there is a guide that allows clarification: the comprehension requirements of the group that must incorporate those results into its method. It can be said, therefore, that the tensions in coordination will be absent or limited in AM and MAM learning, which are actually the modular systems described by Langlois, whose coordination may be left to the market. “Decentralization implies an ability to cut apart the stages of production cleanly enough that they can be placed into separate hands without high costs of coordination; that is to say, decentralization implies some degree of standardization of interfaces between stages. In an extreme – but far from rare – case, standardized interfaces can turn a product into a modular system.” (Langlois 2003, p. 378). In EA learning, these tensions are to be considered present in a more significant way. Von Hippel and Tyre do not provide information about this. They have one only sentence suggesting the presence of such tensions: “Neither game theorists’ models of cooperative games nor psychologists’ models of mutual adaptation offer us much help in predicting the path or the outcomes of this type of multi-party problem solving” (Von Hippel and Tyre 1995, p. 10). However, we may wonder why, if Past Profiler was working badly with a thinner plate, it was decided to intervene on Past Profiler, and not on other variables (on which the homogeneity of the points of solder paste depends) of competence of the engineers engaged in the printed circuits. There may have been a hierarchy shared between modules, such as to give precedence over the latter’s opinion. But if this hierarchy was absent, there must have been a discussion, perhaps even an animated one, from which the laborious construction of a common vision from different views emerged. It can be assumed that, in the processes of EA learning, it is

necessary to distinguish between structured learning (with an established hierarchy) and unstructured. In the first case, there will be fewer tensions in coordination than in the second. Yet such tensions will not be absent as in AM and MAM learning. As stated above, even in structured EA learning, there is an ontological uncertainty. Engineers who need to modify the Past Profiler upon the request of the other group can always argue that no one is sure that this is the right decision. Eventually, the hierarchy established will resolve the issue. Nonetheless, debate and tension between the two parties cannot be excluded.

The following table presents a taxonomy of degrees of difficulty of the innovation process built on the basis of these considerations.

**Table 1:** Taxonomy of difficulties in the innovation process  
(Intensity of tensions in x dimension scale; ontological uncertainty absent = white, where present = big x)

	AM and MAM learning	EA structured learning	EA non-structured learning
Ontological uncertainty		<b>X</b>	<b>X</b>
Tensions in coordination		<b>X</b>	<b>X</b>

### Structured/non-structured learning

Tensions in coordination, uncertainty, and innovative value go hand in hand with the complexity of the production process. This can be seen in two examples. In 1984, Hyundai launched a project for a turbocharged engine with electronic control. According to Kim (1998, p. 518), this decision, which broke with the established knowhow, gave rise to an organizational crisis that was intentional. Managers insisted on moving rapidly from knowhow based on imitation-duplication to knowhow based on creative imitation. It was a move that only became successful in 1992

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after hundreds of tests, but gave Hyundai the Alpha engine which was the basis for its success in the following years, allowing it to compete with the major American, European, and Japanese manufacturers. The engine is a more complex component than that in the previous case, there are six specialist groups rather than two (hydrodynamics, thermodynamics, fuel engineering, emission control, and lubrication; kinetics and dynamics related to engine and car design and CAD; vibration and noise; new ceramics; electronics and control systems; and manufacturing control and CAM) and the learning process was more difficult. "Hyundai engineers underwent 14 months of trial and error before the first prototype was made. However, the engine block broke into pieces in its first test. New proto-type engines were made almost every week, only to be broken again and again. [...] The team had to scrap 11 more broken prototypes before 1 survived the test. There were 288 engine de-sign changes, 156 changes in 1986 alone" (Kim 1998, p. 519). It can be inferred that learning was of the AM kind (the 97 first prototypes), MAM (the 53 prototypes to improve resistance and 26 for transmission) and EA (the 88 prototypes to adapt to the car and 60 for other tests). Kim does not provide information on the details of coordination tensions but one can imagine the problems that had to be addressed and resolved in the long trial months and most of all the errors encountered. Imagine the number of contrasting views (and attributions of blame) that must have arisen. What were the dynamics between the different groups and how were conflicts settled, caught between the goal to produce a competitive engine rapidly and collectively and continual failure? These problems must have been severe as the executives had almost given up, despite being prepared for the difficulties, having deliberately provoked the crisis: "[...] even the Hyundai managers began to doubt the company's capability to develop a competitive engine" (Kim 1998, p. 519).

Confirmation of the growing difficulty of structuring learning with the growing complexity of the production process is evident in a second example of the Smart Home, the house where facilities and services are all controlled by an electronic system. Here three real technological paradigms intersect: construction and plant engineering, electrical appliances, electronic transmission equipment and control. "The Smart Home field connects [different technological] trajectories, and, consequently, brings together different epistemic styles and paradigmatic mindsets that jointly

shape innovation in the field. The coordination problem can be reframed [...] as the challenge to coordinate different paradigm communities in innovation. [...] The existence of technological paradigms at the component level thus not only enables learning at the component level, but it also constitutes a challenge for learning at the system level.” (Peine 2008, p. 522). The production system is not structured. There is no defined hierarchy between these paradigms that clarifies which of these dictates the terms to the others. Tensions in coordination are in this case documented. “[...] in the attempted mode of tight coordination, Smart Home systems were conceived of as integrated systems, and different proposals for a technological paradigm specifying such an integrated system competed in a battle for dominance. [...] However, [...] battle for dominance has remained inconclusive.” (Peine 2008, p. 527). It is also important to highlight that in this lack of structuring and the resulting tensions there lies the greatest leverage innovation. “A most important result of this study has shown that technological paradigms might be an obstacle to innovation. [...] However, this obstacle may be overcome, and the case could demonstrate that technological paradigms, and particularly their persistence, triggered the emergence of loose coordination. It was only because paradigms had frustrated early attempts of standardization that the field moved away from tight forms of coordination in the first place. And this, in turn, bears an important potential. Loose coordination thrives on a more immediate concern for the applicability and the value added of technological solutions, and thus might indeed better suit the needs of end-users. The Smart Home field thus reveals a situation where paradigms pose a challenge in the first instance, but a challenge that, if overcome, bears great potential for innovation.” (Peine 2008, p. 522, 527).

## **Complex productive systems**

One notes signs of increasing difficulty in the structuring of EA learning, tensions in coordination and the value of innovation with growing complexity. It may be thought that this happens because difficulties, tensions and innovation at one level reinforce others and strengthen each other reciprocally. With reference to the taxonomy introduced in the previous figure, two levels should be considered primarily. The common

strengthening of two levels in their difficulty with regard to coordination tensions could be represented in the next table by applying the rule: white on white = white (no difficulty), white on x = small x (moderate difficulty), x on x = bigger x (great difficulty).

**Table 2a:** Taxonomy of difficulties in the innovation process, components and production systems  
TENSIONS IN COORDINATION

		<i>In terms of technology modules</i>		
		AM and MAM learning	EA structured learning	EA non-structured learning
<i>In terms of technological paradigms</i>	AM and MAM learning		<b>x</b>	<b>X</b>
	EA structured learning	<b>x</b>	<b>X</b>	<b>X</b>
	EA non-structured learning	<b>X</b>	<b>X</b>	<b>X</b>

One can thus identify a set of cases where problems of coordination are considered relevant in the lower right hand part of the matrix, and only in one case in where there are none, when innovation is confined within a module and in a technological paradigm (top left cell). Cases where innovation is more effective are also located in the lower right half of the matrix. The table for the uncertainty is simpler since the ontological uncertainty is of the yes-no type. Ap-plying the rule white-white = white, white on x = x, table 2b is obtained. Where there are no tensions in the coordination, there is not even ontological uncertainty but innovation is not very effective (cell top left).

**Table 2b:** Taxonomy of difficulties in the innovation process, components and production systems  
*ONTOLOGICAL UNCERTAINTY*

		<i>In terms of technology modules</i>		
		AM and MAM learning	EA structured learning	EA non-structured Learning
<i>In terms of technological paradigms</i>	AM and MAM learning		<b>X</b>	<b>X</b>
	EA structured learning	<b>X</b>	<b>X</b>	<b>X</b>
	EA non-structured learning	<b>X</b>	<b>X</b>	<b>X</b>

On increasing the number of levels to three, for example, the number of cells in each of the two matrices becomes 27, but this does not change their configuration: all the cells are black apart from one in the case of uncertainty, the lower right gray half tending towards black for tensions in coordination. It has the rule:  $N = 3L$ , where  $N$  = number of cells,  $L$  = number of levels,  $3$  = number of different forms of learning. This analysis conducted in the environment of technical functions suggests elements applicable in the general framework where different specialisms interact both within individual functions (strategic, technical, commercial) and the functions between them. One can imagine, therefore, that innovation is the result of a series of layered interactive learning processes where tensions in the coordination and value of innovation are correlated to complexity, i.e. to the number of levels and to the significantly different forms of learning. The significantly different forms of learning can be held to be more than three, comprising also semi-structured learning, intermediate forms between EA

learning and MAM learning, and intermediate forms between AM and MAM. It can therefore be written that:  $N = aL$ , where  $N$  = number of cells,  $L$  = number of levels,  $a$  = number of significantly different forms of learning. As the matrix becomes larger and the cells increase in number (i.e. the higher the number of levels related), the more the gray tends towards black in the lower right half of the matrix, indicating greater tensions in coordination, but also greater potential for innovation. We could then have:

$P_t = F(P_o, aL_t, aL_o)$ ;  $T_t = G(T_o, aL_t, aL_o)$ , for example:

$P_t = P_o (aL_t/aL_o) = P_o (aL_t-L_o)$ ;  $T_t = T_o (aL_t/aL_o) = T_o (aL_t-L_o)$

where, in addition to  $a$  (number of forms of learning) and  $L$  (related levels) already introduced, we have:  $P$  = Productivity potential,  $T$  = degree of tension in the coordination. This formulation can be compared to that generally used for learning-by-doing dependent on production volumes:  $P_t = P_o (X_t/X_o)^\beta$ ,  $P_t/P_o = \pi = n^\beta$  where  $X_t/X_o$  = ratio of current and initial production volume,  $n$  = multiple of the volume of current production in relation to initial production, and  $\pi = n^\beta$  proportional variation of productivity due to the multiplication by  $n$  of the volume of production. The value of this  $\pi$  learning factor depends on the exponential coefficient  $\beta$ , constant with the variation of  $n$ : the more an operation is repeated the more learning takes place. This has been called passive learning (Thompson 2010). As Lundvall (1992) has repeatedly emphasized, as well as the vast literature on innovative systems, of the two learning mechanisms associated with the wide range of the division of labor, learning by doing neglects "learning by interacting". Such (active) learning has been referred to as interactions between enterprises and society and institutions, between enterprises and other organizations, in particular research centers, between enterprises and customers, enterprises and suppliers, and units within enterprises. Most of these interactions are considered dependent on the degree of "complexification" (Arora, Landau and Rosemberg 1998, Foray 2004, Malerba 2007). A manipulation to the formula proposed here can be written as:  $P_t = P_o (aL_t-L_o)$ ,  $P_t/P_o = \pi^* = aL_o(n-1)$ . Assuming  $L_o=1$ , it is  $\pi^* = a(n-1)$ . Increasing  $n$  times the complexity of the production process,  $\pi^*=a(n-1)$  indicates the proportionate change in productivity that depends on the exponential factor  $(n-1)$  variable in the same direction of  $n$ .

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## Organization of Coordination

Simple innovative processes, with little tension between different players and uncertainty as calculable risk, can be ruled by the market. In those that are complex, where players may be-long to the same but also to different companies, a different organization is required: a coherent set of rules and resources designed to avoid tensions between the different players under conditions of uncertainty. The formal agreements between companies, being written, provide detailed information from which we can deduce the nature of the problems, which are intended to be solved. Examination of such agreements shows that they aim to ensure mutual commitment and avoid conflicts of interest on the goals. As such, the (first) meaning to be attributed to tensions between players is: mutual suspicion of disengagement.

Gilson, Sabel and Scott (2009) consider three agreements. In two of them there are parts that constitute normal supply contracts for defined goods and services and other parts that concern the development of new products in collaboration. The third is an agreement entirely for innovation. The common denominator for all of these is that also in aspects relating to innovation, mutual obligations are defined. This was not obvious. Since the attainment of innovation goals is intrinsically uncertain, and this is confirmed in these contracts, we might expect simple statements of intent, designed at most to outline a route. Instead, they are real contracts de-signed to effectively regulate the set of actions that substantiate the process of mutual learning. In practice, therefore, the impossibility of negotiating on completely unknown results does not impede the establishing of common rules of behavior.

The contract between Deere (farm machinery) and Stanadyne (engine components)<sup>3</sup>, with a duration of five years unless terminated earlier or explicitly renewed, is intended to establish a partnership to promote all the innovations that the two parties are able to achieve, notwithstanding any guarantee of a minimum number of purchases by

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<sup>3</sup> Deere & Company and Stanadyne Corporation Long Term Agreement, Sec Rows 333-45823

Deere of parts supplied by Stanadyne. Stanadyne is obliged to: allow direct inspection of their establishments by Deere; participate in the Achieving Excellence program (which provides a detailed exchange of information on the basis of which, every six months, Deere classifies its suppliers in terms of increasing quality-reliability) in order to reach the top category, Partner; Stanadyne is obliged to accept that if this happens and until Stanadyne maintains that position, any reduction in production costs achieved is divided 50/50 between Deere and Stanadyne, and if not 100 percent to Deere; Stanadyne is obliged also to accept a route of collaborative and transparent planning and implementation; obliged also to accept termination clauses with respect to individual products and with regard to parts of the contract or the contract as a whole; it must accept an extra-judicial conciliation mechanism and accept rules for determining the price of supplies on the basis of costs and ex-post bargaining in good faith (see below). Other provisions relate to the confidentiality of information and the ability to use as agreed patents and new technical developments created under this agreement, in addition to force majeure and insurance clauses.

The theory of incomplete contracts could consider Stanadyne as the seller, called to decide a level of quality of its performance that is not verifiable. This service of the seller would be purchased by the buyer (Deere) at its discretion and "paid" through one of its own services. The process of interactive learning focuses on a continuous inversion of roles, so as to realize a new product in collaboration with whom to share the value. The duration of this process and the result cannot be anticipated. According to this theory, this sequence of exchange of services cannot be efficient in a very general sense (Bester and Krähmer 2008) due to asymmetry and information incompleteness (continuous uncertainty). Each would have no incentive to offer their best performance as there is no guarantee of receiving the same from the other party in exchange. In particular, each may fear that once having made specific investments in their own performance the other party may at some point claim a greater proportion of the result to contribute to their own performance to continue in the process, threatening to move to another supplier/buyer or use the outcomes from the learning achieved for their own benefit, thus abandoning the collective project. Gilson, Sabel and Scott (2009) argue that the contractual solution explored is considered capable of overcoming this difficulty in that it provides

mechanisms (such as the AE Program and the continuous exchange of information) that involve information investments (expensive) from both sides to know the technical and relational capacity of the other: it does not just refer to inexpensive exchanges of information on individual performance. In practice, while Stanadyne invests resources to establish their services, Deere invests to know Stanadyne and vice versa. Specific investments are therefore bi-lateral and as such neither party can take advantage of the other. In this way, the parties enter a reciprocal relationship that involves high exit costs such as losses of specific investments of every kind. In view of this, the contract sets out strict conditions of exit that guarantee that both parties may abandon the project should it prove to be unproductive (as well as if one party breaches the contract). Consequently, the contract may include clauses such as the allocation of costs and of results where profit margins are negotiated ex post in good faith without this bringing ex-ante inefficiency.

This interpretation is also applicable in the second example, an agreement between Apple Computer Inc.<sup>4</sup> and SCI Systems Inc. for the section regarding the development of new products. The same can be said for the third example<sup>5</sup> (Warner-Labert and Ligand) albeit in a context of more complex rules. The three cases provide a view that the purpose of collaborative arrangements between firms for innovation is in essence: to identify the players and the duration of their collaboration, predispose a detailed work plan in phases, each of which is intended to highlight and evaluate the other player's behavior, although the results remain uncertain until the last; ensure a thorough detailed continuous exchange of information; permit exit options in case the project turns out to be unproductive or for particular cases of breach of contract; and to adjust the allocation of costs and outcomes.

The letter of these agreements does not permit information surrounding actual operation. It is conceivable that they also entail implicit

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<sup>4</sup> Fountain Manufacturing Agreement between APPLE COMPUTER, INC. and SCI SYSTEMS, INC. <http://contracts.onecle.com/apple/scis.mfg.1996.5.31.shtml>

<sup>5</sup> Research, Development And License Agreement by and between WARNER-LAMBERT COMPANY and LIGAND PHARMACEUTICALS INCORPORATED dated September 1, 1999; <http://contracts.onecle.com/ligand/warner.rd.1999.09.01.shtml>

acceptance of some form of authority on the part of one party to the other. In effect, there are signs that could indicate that Deere, Apple and Warner-Lambert exercise authority over the companies they collaborate with, particularly because they control the sales network of the products to be realized. However, this authority is limited by safeguard clauses: it is circumscribed by the contract. This contract and authority framework is confirmed in a study that examined the letters of agreement between independent enterprises and their actual performance in the case of development of a new commercial airplane by a network of companies (O'Sullivan 2005).

The cooperation agreements in question could be seen as working protocols for projects in analogy with the "project planning model" (Van de Ven 1980; Hobday 2000) which is considered very suitable for innovation within companies. The project plan could be considered a contract that focuses on the common goal rather than the development of distinct specializations, which would then require integration to realize interactive learning processes. Connecting structures are established, in this case explicitly, with authority with regard to advancement of the process, with the task of facilitating information collection and processing and the experience of the various players, and monitoring their work. Also in this case the contract will define the boundaries of the authority, establishing rules to align the actors' behavior.

## **Conflict On How to Proceed**

In this section, we will see that when the contract ensures mutual commitment, a second aspect of the coordination tensions becomes apparent: the conflict of how to proceed when the same players are mutually committed.

### **In companies**

In work on projects within companies, it is often assumed that there would be no disagreements on how to proceed due to technical reasons, like in a classical model of artificial intelligence. The "program" dictates the instructions to be executed at different operational terminals (staff

resources, technical operations, marketing). As the work progresses, terminals transmit the numerous data of their individual experience to the center where it is processed and selected for the purposes of updating the program. The new program, specified in terms of additional adjustments, is transmitted to operational terminals. This appears to be the Arrow (1974) organizational model. There would be no conflict on how to proceed; simply be-cause there would be no direct relation between the players. Nevertheless, in the same paper Arrow warns that in the uncertainty of innovation processes the gathering, processing and re-laying of information cannot be considered mere technical functions, guaranteed by the plan and the link facilities provided with the authority. Information judged initially or from a certain point of view irrelevant may later or from other points of view be important (Arrow 1974, p. 54). It is precisely this fact that makes it impossible to avoid direct contacts between players that must be mediated, but not through purely technical intervention. We should thus make the analogy with the model of distributed artificial intelligence, whose mode of operation is not sequential (as in the classic model) but parallel. A large number of operating units are simultaneously active in interaction with each other. Program, experience and modifications of the program are found to be connected in every unit. A central agency is needed to organize the flow of information among all players and to monitor time, cost and connections. Besides this technical function, there is also the requirement for a "political" function. Each player is legitimated, in the sense of Suchman (1995, p 574), to insist on his/her own point of view, which is for the common good. Conflict is inevitable. And the political function is called to handle it.

De Clercq, Menguc and Auh (2008) interviewed CEOs and Marketing Directors of 260 industrial companies in Australia to explore the links between innovative capacity, conflicts on how to realize this and conflicts regarding the allocation of company resources. The result is that in the most innovative companies, the highest levels of both of these two conflicts were recorded (De Clercq, Menguc, Auh 2008, p. 1051-1052). The explanation is that while the conflict over the allocation of resources is generally negative for innovative capacity, it becomes positive when it is justified by disagreement on how to proceed. In this case, the disagreement on resources is seen, and effectively constitutes a contribution to the joint

venture. The term that the authors use in this regard is significant: political activity. Moreover, the issue of conflicts within companies engaged in project work is not new. In one contribution often regarded as pertaining to the technical approach (Galbraith 1974), it is taken for granted that there will be conflicts of this nature. Seven years earlier, Lawrence and Lorsch (1967) showed six company case studies in which there is such a technical dimension, but accompanied by a second equally important dimension regarding conflict. After defining differentiation and integration, the authors hypothesize that in the most innovative organizations one should find out the maximum differentiation and maximum integration, but - as these are in opposition - the greatest efficiency of integrative structures must be found (Lawrence and Lorsch 1967, p. 12). The hypothesis is confirmed. However, it is evident in the data from table 12 p. 45 of the essay by Lawrence and Lorsch that the link officials not only had the greater authority technique, but also the ability to manage conflicts. Going further back in time, conflicts within organizations that change in conditions of uncertainty are found in March and Simon (1958). Conflicts then constitute the main issue at the center of the different course latterly taken by Cyert and March (1963), compared to that of Simon who thought more important to study the formation of decisions of agents with bounded rationality in organizations that are well coordinated and in the absence of conflict (Augier and March 2001, p. 224). Finally, Hoegl, Weinkauff and Gemuenden (2004) present a longitudinal study (duration 36 months) of the case of the European automotive industry, examining collaboration both within and between working groups. The project was complex on several levels. Each working group consisted of nine members on average; there were eight subprojects, while the overall project comprised 39 working groups. The link structures consisted of eight project leaders and an overall project director responsible for providing the infrastructure for integration, while the working groups were independent although acting within programs (times and costs) that were defined step-by-step and continuously monitored. The technical complexity would inevitably suggest a model of central planning. The best results were expected as a result of good collaboration within the groups promoted by good collaboration between the groups. In effect, it emerges that collaboration between groups yields good results due to the control of defined working time (a condition for each group interacting with

the others). Collaboration between the groups has no actual effect on the collaboration within the groups. Instead there seems to be quite a strong effect in the opposite direction (Hoegl, Weinkauff, Gemuenden 2004, p. 48). The interdependence between the actors is not so much a technical constraint. It is a goal which can be achieved to varying degrees, giving rise to different results. It cannot therefore be assumed that by itself this interdependence prevents conflict between the players or allows it to be solved easily and automatically. Rather, the opposite seems true: the decisive leverage to obtain good coordination of interdependent actions seems to lie precisely in appropriate conflict management (Marshall 2007). In all these cases, the conflict in how to take forward the innovative joint project arises because each specialization emphasizes its point of view that reflects the best contribution it can and intends to give. There is an inversion of logic with respect to that held in the technical approach: it is not the shared commitment that allows the avoidance of conflicts, but on the contrary, it is this very commitment that causes them to arise. This is therefore a conflict between different identities (specializations) and visions (ways of proceeding), while there are also motives for conflict concerning interests. In fact, even if the conflict of interest on goals is avoided by the contract, different interests are still present in the different ways of achieving the common goal. In this regard we can consider a result obtained by the same Hobday (2000) who also argued the superiority of organization for projects. In the examination of two innovative processes within a company, one organized by the matrix formula and the other in accordance with a project formula, it appears that in the former case, human resources are placed in defined career paths. The functional lines constitute a community of practice in which those who have more experience share it with young people for the purposes of career development. This does not happen in the project organization. Each project member is responsible for his/her own career and will have a strong drive to outshine the others (Hobday 2000, p. 885, 892).

### **Between companies**

Concrete cooperation agreements between firms are aimed at preventing disengagement. If these organizational measures are effective, the different

players of innovation are linked by a bond of active participation. These agreements typically contain arbitration clauses that may be interpreted as a means to enforce contracts against disengagement. On the other hand, there could be a different interpretation: the internal arbitration procedure could be seen as a support to the management of conflicts that arise when the common commitment is guaranteed. The spread of these clauses would therefore be a significant sign in favor of the hypothesis that conflicts on how to proceed would be fueled by mutual commitment, even between firms.

Such agreements between companies often provide for extra-judicial arbitration in the form of “escalation procedures” (Jennejohn 2009). In the case of conflict and following all possibilities of composition between the players, the matter will be taken to the highest level for examination by a peer group of managers. If agreement is not found at this level, the issue will be presented to CEOs. Only if this fails will the matter be resolved by outside arbitration and/or the courts. Eisenberg and Miller (2006) examine a sample of 2554 commercial contracts of all types and find that the arbitration clauses that avoid immediate recourse to courts are quite rare. This holds only in 10.6 percent of cases. By contrast, Jennejohn (2009) finds that similar clauses are found in 49.7 percent of agreements of collaboration between companies for innovation, in a sample of 8705 agreements of this type found between 1.1.1991 and 31.12.2005. The use of these contractual clauses specifically in innovation agreements, which are necessarily incomplete, is difficult to interpret. The traditional point of view would entrust implementation of incomplete contracts to the courts, called to fill the gaps by recourse to the “legal system”. In Jennejohn’s (2009) interpretation, there is no recourse to the courts because the criteria on which to base the assessment cannot be established outside the specific organization and cannot be defined when a third party is called upon to enforce them (Jennejohn 2009 p. 28, 36, 51). Such reasons could be held consistent with the causes of disputes generally due to accusations of doing little or badly. According to this explanation, arbitrations would be established to enforce the contract against disengagement, being unable to resort to the assistance of the courts. But there could be another explanation. The same reasons, with greater relevance, might explain the non-recourse to the courts because it is known that lawsuits do not

normally arise from allegations of doing little or badly, but as a result of different ways of looking at what must be done. The same conclusion of Jennejohn seems to go in this latter direction (Jennejohn 2009 p. 51). It must be added that even in agreements between companies a profile of conflict of interest is evident not on the goals but on different interests regarding the ways of acting. The agreements in question determine pricing for the supply of new products or components on the basis of detailed information on standard costs and margins which are negotiated in good faith. This may be an incentive for the supplier to propose a maximum use of its competencies and insist on its points of view on how to proceed in order to contain actual costs.

### **Conflict from voice opportunism**

Contract guarantees mutual commitment, but not the absence of conflicts. These arise from conflicting views on the best course of action from different specializations and are legitimized by their mutual commitment. This is an added coordination problem that may be referred to as voice-opportunism, the temptation of players of a shared project to prevail individually. The definition of voice-opportunism conflict must therefore take into account the fact that it is not a disagreement about objectives, but on how to reach them. It is not simple disagreement but a tension to prevail, the conflict pushing for ways out. Applying the definition of Hartwick and Barki (2002), conflict requires the simultaneous presence of three dimensions: cognitive (disagreement on how to proceed), behavioral (active promotion of individual points of view against those of others), emotional (anxiety over the outcome of the common project).

A first route out of the conflict, which seems to be the fastest and easiest, is that of compromise. One must question, however, whether this is best in terms of innovation. It will now be seen that it is not.

The literature on the links between conflict and innovation is substantial. It should also be considered, as frequently emerges, that explicit conflict is viewed with fear within organizations and thus is often hidden. These analyses have therefore had to go deep in order to document the emergence of conflict situations that appeared far from clear. The large number of these studies may thus give evidence that conflicts in innovation

processes are also frequent among players that share the same goals. Underlying this extensive research is the question of whether the conflict in question is for or against innovation. Up until 1980, the dominant idea was that conflict was against (Brett 1984) and that it was necessary to solve it quickly. Subsequent studies showed a frequent positive correlation between conflict and innovation (Van de Vliert and De Dreu 1994). Finally, in recent works the position is more complex. Conflicts are seen as positive when they are neither too mild nor too acute (Anderson, De Dreu and Nijstad 2004). On the other hand, it is not particularly easy to distinguish between task conflicts (positive) and relational conflicts (negative): one often entails the other (Mooney, Holahan, 2007). Conflict management thus seems very demanding: how does one determine the right amount of conflict? And even if it could be determined case by case, how can it be obtained? It would therefore be better to seek compromises through negotiation (De Dreu 2008). Kesting and Smolinski (2007) however, show that this practice cannot be effective if the uncertainty is of the continuous type. In this regard, the case of large Open Source software virtual communities seems to be instructive. They do not bow to pressure with regard to timing and the cost of the innovation process not pursuing profit. The practice of negotiation should therefore be easier. In effect it is widely used. Despite this, conflicts are not avoided (Jensen and Scacchi, 2005) and have to be managed by leadership. Compromise would, on the other hand, be a logically untenable response. If the actors' bond of committed participation is effective and comparison between the positions that seek to prevail is legitimate, then the compromise that requires mutual (although partial) sacrifices cannot be legitimate. Under conditions of uncertainty, no one would be able to justify these sacrifices for the sake of uncertain results. There are additional reasons, to be discussed shortly, which discourage notions that innovation may be efficiently achieved through compromise. There is a way out of this impasse but it is necessary to reverse the current logic of the relationship between conflict and innovation. The most widely used scheme envisages an innovation process resulting from a series of inputs, which may include conflict (Hülshager, Salgado and Anderson 2009, table 3 p. 1138). On the other hand, one should think of innovation itself as the positive (although not guaranteed) exit from conflicts. Conflict cannot be resolved by claiming everyone is right to a slight extent. It is to be

resolved by arriving at a new interpretation that does not deny different, conflicting points of view, but that is produced by them (Cameron 1986).

## **Conflict and innovation**

Conflict, or disagreement on how to proceed, among contrasting standpoints, with anxiety for the fate of the common plan, offers a possible way out towards innovation, but only by ruling out compromise even if it entails the risk of destructive results. In this section, we will see that innovation requires insightful solutions that entail changes in interpretative codes. Such changes lead to a redefinition of the very destiny shared by the actors in the innovation process. Hence, innovation can be interpreted as the result of a particular kind of conflict, “im-perfect not negotiable”. Leadership, the focus of next section, will have to be able to promote and manage this kind of conflict.

The Berliner Georg Simmel (1858-1918) is to be credited for one of the first modern contributions on conflict (Simmel 1903), anticipating analyses widely found today (Song, Dyer, Thieme 2006). The ways out of conflict are characterized by Simmel in terms of inclusion and cohesion. Inclusion refers to the amount of advises taken, cohesion is the force of the links obtained among them. The possible outcomes of the conflict can be ordered in increasing inclusion and decreasing cohesion. The first is annihilation (or even escape), which most strengthens cohesion but excludes the losers (Simmel 1903, p 499). The second is submission, in which there is slightly greater inclusion and slightly less cohesion since the losers are not annihilated but silenced (Simmel 1903, p 499-500). The third is war or clash, an irreducible op-position among parts in which the degree of cohesion is even lower and the degree of inclusion is greater (Simmel 1903, p 500, 508). The fourth outcome is a compromise that obtains the maximum inclusion and the minimum cohesion (Simmel 1903, p 509-510). However, in Simmel’s opinion compromise does not conclude the list of the outcomes of the conflict, which includes another: creativity or innovation. Innovation will be able to give rise, at the same time, to greater cohesion and also to greater inclusion (Simmel 1903, p. 491-492, 516-517).

It can be considered that war or clash is not a stable solution to the conflict between mutually committed actors. It is a case of a “double bind”

(Bateson, Jackson, Haley, Weakland 1956, p. 254): the situation in which, among subjects joined by an emotionally relevant relationship (anxiety for the collective plan), the communication of one towards the other presents an in-consistency between the level of explicit speech (that which is stated) and a further communication level (such as gestures, attitudes, tone of voice); the receiver of the message cannot decide which of the two levels to accept as valid, nor notice the inconsistency. In fact, the two communication levels will be contradictory. On the one hand, mutual commitment encourages everyone to genuinely express their different points of view. On the other, in the hypothesis of war, their antagonism will be able to transmit messages of mutual blame, disdain and hostility. During confrontation then, there will be a drive towards “more”. The more a position feels threatened, the more it will express itself strongly, the more conflict there will be, the more - in order to exit the conflict - the positions considered weak will be threatened, the more the latter will want to express themselves strongly and so on. Hence the outcome of this spiral cannot be an endless conflict. It will have to end either with the breach of the agreement, or with one of the other two results: compromise or innovation.

Secondly, it can be noted that there will be no procedural continuity between compromise and innovation. In short, we can pass from conflict to a compromise and from conflict to innovation, but not from conflict to compromise to innovation.

Compromise and innovation seem to be incompatible as both exhaust the conflictual drive. We are dealing, respectively, with the change 1 of Watzlawick, Weakland and Fisch (1974) and change 2. In change 1 (compromise) there is a change in what is being said: a change in the language. Through colloquial comparison between different positions, the propositions used to express the latter are processed through algorithms typical of these same positions. Each position agrees upon the others. By contrast, in change 2 (innovation) the solution requires liberation from rules and bonds typical of the language practiced through the introduction of a new code. This second type of change, in reality innovative, demands insight: every interpretative principle persists strongly because it has internal consistency and because it corresponds to real experiences that confirm its good sense. Therefore, a different code seems to be *ex ante* “senseless”. This is also the viewpoint of Kurt Zadek Lewin, whose

contribution – criticized or forgotten in the 1970s – has now been rediscovered in the sphere of complex approach systems of social dynamics. “Lewin was primarily interested in resolving social conflict through behavioral change, whether this be within organizations or in the wider society. [...] The primary methods he developed for achieving this were Action Research and the 3-Step model of change. [...] – ‘unfreezing,’ ‘moving,’ and ‘refreezing’ [...]” (Burnes 2004, p. 987, 998). Unfreezing takes on a similar meaning to doubting about the previous code, moving is similar to a change in this code, and refreezing is similar to establishing a new code.

## Insightful solutions

The solution of problems through a change in the interpretative canon seems to be obvious once it is found. Often, however, before arriving at this point, the actors have reached an impasse. The solution ultimately depends on particular skills, such as seeing images that are out of range or hidden, that are useless when it comes to “normal” problems (Bowden, Jung-Beeman, Fleck, Kounios 2005, p. 322-323). The search for insightful solutions has tended in two directions. In the Special Process approach, the idea is that cognitive resources not activated spontaneously are required. On the contrary, in the Business-as-Usual approach the interpretative canons are practiced, only extended with a broader vision that allows a solution to be attained. However, there is also an intermediate position (Bowden, Jung-Beeman, Fleck, Kounios 2005). Difficult problems enable strong cognitive resources, which are partially use-ful, as well as weak resources that explore in other directions. The solution entails a cumulative strengthening of these weak resources<sup>6</sup> to make them dominant (Bowden, Jung-Beeman, Fleck, Kounios 2005, p. 324). In any event, a broader vision or cognitive resources exploring in unusual directions are also activated on the basis of external drives. But where can the strengthening of these forces come from? The answer that is suggested by the two case studies that follow is that such strengthening comes precisely from conflict not concluded by compromise managed by an effective leadership. The typical traits of

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<sup>6</sup> Such resources can be those of apparently weak knowledge or even those of weak actors, as emphasized in various studies on the role of minorities (Nemeth, Wachtler 1983; De Dreu 2002)

insightful solutions emerge in a case of success (Echelon) studied by Lane and Maxfield (2005): conflict between different points of view, possible compromise, innovation due to conflict without compromise, that drive toward the change in the interpretative code managed by a strong leadership. The Olivetti – Programs 101 case confirms that compromise threatens innovation even when the conflict has already produced initial yet important innovative results.

In 1990, Echelon, a Silicon Valley company, created a new technology of universal control, LonWorks®. At that time in the United States, control systems were present in several fields (air conditioning, lighting, lifts, security, mechanical, electrical and electronic plants, handling of liquids and granular solids, home automation) and each of them responded to the classic cybernetic paradigm: sensors and peripheral activation units connected to a central computer that processed incoming data and sent back operative commands to periphery units. Echelon's idea was conceived by the realization that, with the appropriate technology, it was possible to shift to distributed control. Echelon's LonWorks® technology is based on a low-cost integrated circuit that processes information peripherally so that a network of intelligent nodes is created. Given the potentially very wide fields of application, Echelon initially took the idea of its engineers seriously according to which LonWorks® would perform a similar function to personal computers, supplanting expensive large computer systems connected to "stupid" terminals. Of course, this great change would call for the creation of a completely new industry, with new products and new professional figures and organizational forms. The problem was how to favor this difficult transition by a small firm facing a system with many firms, some of them large, dominated by the traditional paradigm. Up to 1996 a certain success was achieved, though very slowly. With regard to the expectations formulated five years earlier, an impasse had clearly been reached (Lane and Maxfield 2005, p. 18). The problem was that there were no firms that could serve as an interface between Echelon and the installer companies. It was necessary, therefore, to promote this network of integrators of LonWorks® systems. At this point in Echelon two lines of action entered into conflict, supported by two different views but by a single interpretative code. One of them was suggested by the results already achieved by targeting large companies, such as Olivetti and

Ameritech, that provided systems in vast office complexes, in the first case, and in buildings, in the second case, offering technology able to improve their functionality appreciably. The other, supported by those with other experience in their own professional careers, sought to involve “independent control contractors” who competed with large companies in the sector of medium systems, using devices that they adapted to customers’ specifications (Lane and Maxfield 2005, p. 18, 20, 21). The second line would require rapid development of the new product LonPoint® created by having engineers add to LonWorks® a programmable algorithm of control. Conflict between these two lines, that called into question the very identity of Echelon, broke out mid-way through December 1996. The argument adduced to support the first line was that it was not possible for Echelon to turn their back on large firms, or else the latter would develop alternative products. The argument in favor of the second line was that large firms would not easily accept changing their technologies for new ones that would demand radical changes to the entire design of their large systems. On the contrary, small firms had to buy control technologies in any event and hence it was easier to use those that were more efficient. However, the interpretative code was the same in both cases: everything depended on the degree of technical superiority of the Echelon product; it was therefore a question of electronic engineering. On the basis of this common interpretative code, it was possible to come to a compromise: to implement both lines and continue on the course already undertaken and slow down the development of products on the LonPoint® track in order to await the results of further experiments. However, the top management did not opt for this compromise. It decided, instead, to go ahead with the decision to explore the second way, even if serious doubts remained (Lane and Maxfield 2005, p. 33). The decisive impetus came from an unexpected external direction and in the space of a year it proved decisive. In the autumn of 1996, the Echelon technicians went to visit the control system of the 50-floor IBM building at 590 Madison Avenue, New York City, upon the invitation of TEC that had installed it. They came back from this visit with the awareness that they did not know very much, about what the TEC technicians had allowed them to see, especially in two respects. On the one hand, the control systems actually applied to large plants were much more complex than that envisaged (the IBM building required 40,000 lines of commands

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in order to function) and hence the programmability of distributed control had to be much simpler. On the other hand, the installation and the new system had to be carried out “like a heart transplant. Overnight you have to cut-over from one system to the other, so there’s heat in the building in the morning – pipes hissing, compressors banging, a lot of ad hoc adjustments to do, very different from an intellectual appreciation of the problem.” (Lane and Maxfield 2005, p. 34). Based on these considerations, starting from early 1997, the engineers began to modify the apparatus to make it become more user-friendly. And it was at this point that an important event occurred<sup>7</sup>. In September 1997, a three-day meeting was organized with five companies of systems integrators, including TEC, conceived as a training course for testers. The Echelon officers presented a number of prototypes and described plans for their completion. They also asked for comments and suggestions or proposals. The small system integrators used that occasion with enthusiasm and flooded Echelon with advice. The full understanding of the apparatus by the installers had provided its results. Thanks to the visit to NYC, the Echelon technicians had been encouraged to change their interpretative canon. They had understood that the problems with the small system integrators, who did not have high electronic engineering skills, lay not so much in the technical superiority of the product as in its ease and transparency of use. Many of the modifications requested would probably have been thought of sooner or later by the Echelon engineers, but they would have been a small subset of a long list without any priority. Hence, the benefit that came to Echelon was decisive. The products ready to be delivered in the spring of 1998 contained the majority of modifications recommended. During the second visit to the IBM building when, after the new system had been installed in an area of the plants, lightning cut off the current and, once restored, everything had been automatically reset, while the operators ran everywhere to restore the controls of the old system. Already by 2003, only fifteen years after the creation of Echelon, 4000 companies had purchased its technology, and the total commercial figure that surrounded it was estimated US\$1.5 billion.

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<sup>7</sup> It is mentioned in a previous manuscript (on page 31 of D. Lane and R. Maxfield: *Incertezza ontologica e innovazione*, Università di Modena), then strangely omitted in the version of the essay of 2005

In the Olivetti case, the conflict is between the electromechanical paradigm and electronic paradigm (Perotto 1995). However, it is not a question of a conflict between preservation and innovation, as it might nowadays appear. The parties in conflict were all truly committed to innovation. The supporters of the electromechanical paradigm were not conservative opponents of change. Their positions of power in the company were based on the myth of “designers-inventors”. Nonetheless, the conflict turned into a real war in which the engineer Pier Giorgio Perotto and his team of electronic designers risked being annihilated. They managed to emerge from the corner in which they had been confined thanks to the creation of an absolutely new product, the result of a change of interpretative code promoted by the very danger of annihilation, the machine “Programs 101”, the first personal computer in the world. Between 1963 and 1965 the engineer Perotto was obliged to accomplish the leap forward by himself and with a few collaborators, from the code that privileged machines to that which gave importance to users, which in Echelon’s case was carried out by the whole company between 1996 and 1998 in the field of control systems. This realization re-opened the stakes in Olivetti, but the result was a compromise that did not allow the rapid allocation of necessary resources to Programs 101. Hence five crucial years were lost during which the new idea of the personal computer was maximized in the United States and the Italian firm missed a historic opportunity. Later when asked whether things could have gone differently, Perotto replied that if Adriano Olivetti had not died before his time, his leadership would not have allowed this great opportunity to be wasted.

## **Imperfect and non-negotiable conflict**

According to Perotto, Adriano’s leadership would have known how to re-interpret the role of Olivetti, in the world they were entering, away from the dominant paradigm. Also in the Echelon case, interpretation of the company’s role lies at the center of the innovation process that succeeds only after the role itself has been reviewed. The interpretative code that agents use in their relationships is thus closely related to the interpretation that they give of their “common fate” (Berkhout 2006). Therefore, it seems to emerge that the conflict between agents engaged in the innovation

process is an “imperfect antagonism” (Schelling 1980), because they feel they share a common fate that they themselves are building. The conflict is imperfect because, while destructive outcomes are not excluded, it can be considered that the prevailing force is toward non-destructive results, since agents are linked by an interdependence now and in the future (common fate<sup>8</sup>). In default of leadership, the cohesive force of the common fate may well push toward the compromise result of maintaining long-term interpretative codes. Indeed, innovation comes only from new interpretations of the common fate. The conflict that turns into innovation can thus be defined as imperfect non-negotiable conflict. Thus, the function of leadership appears to be to sustain and manage this sort of conflict, and favor external relationships, building on internal weak cognitive resources (thus accepting an apparent strong risk of error), enhancing and not repressing differences, and nonetheless nurturing the sense of common fate (Hülshager, Anderson and Salgado 2009, p. 1139).

## Leadership

If company managers were asked what the first tool for innovation was, they would probably reply: leadership<sup>9</sup>. On the other hand, this subject

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<sup>8</sup> Common fate is something more than interdependence. It is the narrative that attributes meaning to the presence and activity of all during the course of time. Interdependence and common fate define according to Lewin a “group” whose members assume collective responsibility. “It is not similarity or dissimilarity of individuals that constitutes a group, but rather interdependence of fate. [...] What is more, a person who has learned to see how much his own fate depends upon the fate of his entire group will ready and even eager to take over a fair share of responsibility for its welfare.” (Lewin 1948, p. 165-166).

<sup>9</sup> The McKinsey survey (September 2007) posed this question to 1458 company directors belonging to different sectors in different countries. The interviewees could choose from seven alternatives. 47 percent of the highest level directors and 58 percent of the other directors indicated leadership. Other answers all had lower results: promoting behaviors of risk assumption (43, 52), improving the decision-making processes (35, 41), making the directors aware of the real importance of innovations (35, 38), spreading the meaning of urgency of innovation (33, 33), presetting accounting instruments on innovative processes (22, 26),

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is covered widely in the literature. Reviewing the contributions from 1990 to 2005 that dealt with leadership in companies, Porter and McLaughlin (2006) found 373 in 21 journals, classifying them into 60 percent empirical and 40 percent theoretical. A recent review focused more on complex change and leadership (Uhl-Bien, Marion 2009), including a bibliography of 146 entries. This great quantity of works is justified by the importance that organizations give to the subject and by a thorny question that they keep on asking: what are the distinctive skills of good leaders (Bolden, Gosling, Marturano and Dennison 2003).

### **Leadership for innovation**

The features of effective leadership in innovation processes, also known as transformational leadership, have been pointed out through repeated observations (Avolio and Bass 1991, Mumford, Scott, Gaddis and Strange 2002, Antonakis, Avolio and Sivasubramaniam 2003). They are consistent with the functions that emerged in the previous analysis: favoring external relationships, building also on internal weak cognitive resources, enhancing differences, nourishing the sense of common fate. Among these traits, the “idealized influence” deserves particular attention. It emerges that the leadership for innovation must be perceived and be effectively bearer of “higher-order ideals and ethics, [...] charismatic actions [...] centered on values, beliefs, and sense of mission.” (Antonakis, Avolio and Sivasubramaniam 2003, p. 264). Only in this way can it actually carry out those functions (Burke, Sims, Lazzara and Salas 2007). Moreover, leadership, consistently with this profile, takes responsibility for any failures as far as presenting itself as a “servant leadership” that considers the needs, expectations and interests of others the most important (Greenleaf 1977; Barbuto and Wheeler 2006; Liden, Wayne, Zhao and Henderson 2008; Sosik, Jung and Dinger 2009). The consequences are decisive. Innovative leadership cannot also assume at the same time the functions typical of the contract (Jansen, Vera and Crossan 2009). The reason for this is that the innovative leader could seem to betray his/her idealized role whenever

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creating working groups devoted to innovation different from those who deal with routines (19, 24). (TMQ 2007).

obliged to decide without rules, for example, the substitution of certain agents, to impose aggressive deadlines in contrast, to skimp on resources, even to abandon courses undertaken that seem rather unproductive, in general to take decisions that can seem in contrast with the valuing of differences, weak resources and common fate (Cha and Edmondson 2006). These behaviors, even if they can be objectively justified (Krantz 2006), would be interpreted as a betrayal of those values and ideals that are held to be typical of the leader. Suspicion toward the leader is, however, a useful attitude because it allows the avoidance of a very dangerous syndrome pointed out by Gemmill and Oakley (1992, p.273): “the leadership myth functions as a social defense whose central aim is to repress uncomfortable needs, emotions, and wishes that emerge when people attempt to work together”. This does not mean that the leader has to be deprived of his/her power. It implies rather the necessity for a precise distinction of roles and functions. The function of the contract is to establish impersonal rules that circumscribe and “defend” the function of leadership.

### **Disengagement**

Leaders who undertake the functions of the contract will sooner or later be accused of working for their own interests or their own views or to promote their own identity, rather than serve the common innovative mission. There will then follow a misalignment of goals among agents. The conflict on how to proceed will then turn into conflict on the very goals and mutual commitment will vanish. It will then be evident that leadership, essential because of a voice-opportunism conflict (lever of innovation) due to contract for mutual commitment, must be seen as complementary to this. If, on the one hand, the contract is not enough and leadership is necessary, on the other, strong leadership cannot replace the contract. In this latter case, the danger of exit opportunism will return. We will have to expect, therefore, that innovation is interrelated to leadership and contract at the same time; that the moves towards compromise will be important if the leadership is weak, or towards the lack of commitment if the contract is weak. In this framework, strong leadership coupled with weak contract means that the leader’s authority is not clearly circumscribed by the contract that poorly defines the commitment rules. Strong contract and

weak leadership means that well-defined, articulated rules provided by the contract are intended formally or informally also as a means of substantially avoiding authority and leadership, or a lack of leadership due to management's personal inability to carry on the role of "transformational" leadership.

## Competing theories and discussion

According to the theory outlined here, once the innovation process is defined as interacting non-structured learning by various specialized actors in the context of ontological continuous uncertainty, tensions in the coordination among actors are seen as conflicts both on goals (due to exit opportunism), and on how to reach the common goal (due to voice opportunism) which has been contractually agreed upon. The achievement of truly innovative solutions requires transformational leadership so as to avoid a compromise solution. This idea is part of the dialectical interpretation of Action Theory in which the "pattern-maintenance function is counter-instrumental with regard to the function of goal-attainment, and their adaptation is counter-instrumental with regard to the function of integration." (Ajzner 2000, p. 169). Contract (alone) may be seen as counter-instrumental to innovation attainment (due to compromise), and leadership (alone) is counter-instrumental with regard to mutual commitment. As Ajzner points out (Ajzner 2000, p. 169-170), this means that the systemic problems would be eliminated if the pattern-maintenance function (contract) could fulfill goal attainment, and adaptation (leadership) could fulfill pattern maintenance. This switch of functions seems to be the main message of two theories that, starting from the same premises about interactive learning, provide tools to avoid conflict. One, the "separate venture" solution, argues that a particular kind of contract is supportive of the innovation process without authority and leadership. In the second, "dynamic routines" are capable of supporting the process without the contract. Both are likely to outweigh the conflict.

Macher and Richman (2004) in a three-case study (Motorola, Kodak, IBM) note that "managers within each organization concluded that the current structures and routines in place could not succeed in the new technological paradigm [cellular phone, digital imaging, personal computer]

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and their firms consequently would not sustain industry leadership if they remained burdened with the existing structures and routines designed for stable and incremental innovation.” (Macher and Richman 2004, p. 6-7). They went on to develop new organizational structures targeting the demands of the emerging technological paradigm: the separate venture solution. This solution may be achieved by acquiring a different firm that has started to develop products under the new technological paradigm, by creating a joint venture or by establishing a division that is organizationally separate from the rest of the firm. In any case, this separate venture “is unique in that it has objectives that are largely independent and in some senses counter to the rest of the firm. As new technologies develop within the separate venture, distinct routines often emerge [...] These routines are usually distinct from the current routines within the existing organization in that they are specifically targeted toward developing and commercializing the new technology.” (Macher and Richman 2004, p. 7). The separate venture can be thought of as a contract that creates a commitment to an innovation goal by establishing a separation between insiders and outsiders of the separate venture, and by guaranteeing independence from (even opposition to) the rest of the organization (Christensen 1997). Revisiting Simmel’s view and partially Coser’s (1956) interpretation of that view we may see that this solution prevents conflict between actors in the innovation process. Within the separate venture established to reach the innovation goal, the contract will avoid conflict on goals and means because the insiders have an incentive to act as a team in order to support opposition to the rest of the organization. From this point of view, no authority or leadership is needed.

In this separate venture solution, routines are seen as counter-instrumental to change. However, Feldman and Pentland (2003) argue that this “conventional wisdom [...] is only part of the story. While it is true that routines facilitate cognitive efficiency, they also embody a selective retention of history, filtered by subjectivity and power. [...] By directing attention to the per-formative [...] aspect of routines [not only to the “ostensive” aspect] our theory emphasizes the contingent [...] nature of routines as source of their variability.” (Feldman and Pentland 2003, p. 115). Accordingly, the ostensive aspect of the routines (as repetitive recognizable patterns of interdependent actions carried out by multiple actors) has the

function of guiding, accounting and referring, like a musical score. However, this ostensive aspect substantially needs the performative aspect in order to constitute a routine, in the same way in which a musical score requires actual musical performance (Feldman and Pentland 2003, p. 102). Thus, as in the musical metaphor, the performative aspect involves introducing variations. Furthermore, while routines, “as an agreement about how to do the work, reduce conflict” (Feldman and Pentland 2003, p. 98), in the move from the performative to the ostensive aspects of routines, variations may or may not get incorporated into the ostensive aspect and this “depends on the power of particular individuals or groups [...that] have the power [...] to turn exceptions into rules and, thus, enact organization in ways they think appropriate.” (Feldman and Pentland 2003, p. 110). In sum, this theory of “dynamic routines” entails authority and leadership as the means for innovation without conflict.

The two theories - separate venture and dynamic routines - taken separately succeed in avoiding conflict and supporting innovation by means of either contract or leadership. This is contrary to our hypothesis on conflict-contract-leadership. However, these theories are not necessarily incompatible with one another. Dynamic routines may open up several opportunities for change; one of them is chosen; a separate venture is established in order to develop its innovation potential. This in fact happened in the cases studied by Macher and Richman (2004). The same holds in the case of IBM System 360 (Pugh, Johnson and Palmer 1991). In this way, however, contract and leadership are both necessary and conflict is not avoided. The continuous ontological uncertainty could play a crucial role here. If there were only one option for change (as in the separate venture hypothesis), conflict could be avoided. The same would hold if several options existed but they were clearly defined (as in dynamic routines). In reality, different options for change exist and the result is uncertain. In this case, conflict may be unavoidable, as emerges in case studies.

## **A preliminary application**

The previous discussion should be accompanied by carefully designed empirical research in order to verify one of the three hypotheses.

An initial application can be presented in relation to Territorial Pacts (TPs) in Italy. TPs are public-private agreements on the coordinated implementation of private and public investments aimed at developing a given area. While in the rest of the paper we discussed innovation in the private sphere, TPs refer to organizational and institutional innovation in the public and social spheres. However, some results seem of general interest.

Between 1997 and 2009, 220 TPs were started, 153 in southern Italy, and 67 in central and northern Italy. In all, they were allocated 5 billion euro, five percent of total public investment in that period. TPs aroused particular attention and became the opportunity for detailed analyses of local development in Italy (Barca 2006a, 2006b, 2006c). The experience of TPs offers the possibility to assess the contract-leadership model by exploiting the high diversification in the contracts among agents through which implementation took place: strong contracts, weak contracts, very undemanding formal declarations of intent. Leadership also played a major role in TPs, again of different kinds and strength. Finally, the results of TPs are also very different, from success to failure.

Qualitative field research was carried in 2001 by Cersosimo and Wolleb (2001). "The paper identifies some of the causes explaining the different performance of the TPs: [...] leadership, the accumulated experience of collective action and the capacity for institutional building by local actors." (p. 369). Building on this preliminary work, in 2002-2003 quantitative research was carried out by several scholars (DPS 2003)<sup>10</sup>. Finally, Piselli and Ramella (2008) widened the analysis with new case studies. A data set of 30 TPs (established between 1997 and 1999) is now available. By standardizing the data and building an index of economic results (risc<sup>11</sup>), we can now appreciate that the economic and socio-

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<sup>10</sup> Piera Magnatti of Nomisma, Gianfranco Viesti of the University of Bari and Carlo Trigilia of the University of Florence, scientific research director Francesco Ramella of the University of Urbino. The processing of data and the construction of indicators was edited by Francesco Ramella with the collaboration of Luigi Burrioni of the University of Florence. Magnatti, Ramella, Trigilia and Viesti (2005) published the results of the research in a volume.

<sup>11</sup> Weighted average of the normalized values of the indicators: 1) impact on the local economy; for every single TP this element was found through the data gathered in the case study,

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institutional features of areas account for a very modest share of the variance of this index. The same holds for the endowment of social capital. On the contrary, as Cersosimo and Wolleb (2001) outlined, indexes of leadership<sup>12</sup> and contracts<sup>13</sup> are both significant, but in a complex way. These complex relationships between economic results and explicative variables can be made sense of by grouping TPs into four sets by using the leadership-contract type suggested by the theory. The first set (weak contract and weak leadership) consists of four Pacts: Pisa, Cosentino, Basso

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assessed comparatively (comparing it with other cases analyzed) and translated into a graduated scale: weak, medium, strong impact. 2) Improvement of the local economic structure according to assessments expressed by qualified interviewees; average percentage of interviewees that indicated a positive influence of the agreement: a) on the innovative skill of companies, b) on product quality, c) on the cooperation between firms or companies, d) on trust relationships between companies); 3) Improvement in the endowment of public goods and in the attractiveness of the area according to qualified observers with reference to the average percentage of interviewees who indicated a positive influence of the agreement: a) on the formation of the labor force, b) on the endowment of public services and company infrastructures, c) on the attractiveness of the area for external investments, d) on the endowment of social infrastructures. (DPS 2003, p. 44).

<sup>12</sup> An appropriate index was constructed from factor analysis. The scores are given by averages of normalized values of indicators drawn from case studies: 1) presence or absence of a personal leadership that carries out a recognized function of guide in the coalition that supports the agreement; 2) strength of leadership (these data were assessed comparatively in the TP and translated into a graduated scale: high, medium, low) (DPS 2003 p. 27).

<sup>13</sup> The index refers to the sum of scores of indexes of partnership intensity calculated from factor analysis. The scores are given by the averages of normalized values of three indicators drawn from case studies: 1) commitment (these data were assessed comparatively in the TPs and translated into a graduated scale: high, medium, low); 2) presence or absence of a limited group of agents that carries out the incentivizing and coordination role for the coalition of local agents supporting the agreement; 3) number of protocols signed (DPS 2003 p. 27).

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Veronese del Colognese, Lecce. The second group (weak contract, strong leadership) consists of 13 TPs: Conca Barese, Benevento, Palermo, Piombino Val di Cornia, Avellino, Miglio d'oro, Maremma grossetana, Livorno, Sud Basilicata, Nord Barese Ofantino, Cuneese, Simeto Etna, Foggia. The third group (strong contract, weak leadership) consists of 5 TPs: Taranto, Vibo Valentia, Sistema Murgiano, Ferrara, Valdichiana. The fourth group (strong contract, strong leadership) consists of 8 TPs: Napoli Nord-Est, Rovigo, Caltanissetta, Teramo, Canavese, Sangro Aventino, Locride, Alto Belice Corleonese.

**Table 3:** Results (*risec*) of TP according to leadership and contract

	WEAK LEADERSHIP	STRONG LEADERSHIP
WEAK CONTRACT	No. of cases 4 Average <i>risec</i> -0.50 Variance 0.49	No. of cases 13 Average <i>risec</i> -0.53 Variance 0.87
STRONG CONTRACT	No. of cases 5 Average <i>risec</i> +0.37 Variance 0.18	No. of cases 8 Average <i>risec</i> +0.88 Variance 0.67

TPs with strong leadership and strong contract perform significantly better than TPs with weak leadership and weak contract. Moreover, the coupling of strong contract and weak leadership is associated with lower results than those in which leadership is also strong. Finally, with strong leadership and weak contract we have the worst results, although it must be taken into account that in this case the variance is particularly high.

The analysis can be refined by using some proxies for “compromise” and “disengagement”. A good proxy for compromise is an index of rapidity of spending (*v\_erog*). As emerges from monographs on cases (Cersosimo

and Wolleb 2006), this index was high when all agents converged on undemanding projects. For disengagement, the proxy is revocation and renunciation of plans as a percentage of public funds allocated (renunciations).

**Table 4:** Results (risec), leadership and contract, disengagement and compromise

	<i>WEAK LEADERSHIP</i>	<i>STRONG LEADERSHIP</i>
<i>WEAK CONTRACT</i>	No. of cases 4 Average risec -0.50 Average $v_{erog}$ 1.51 (compromise) Average renunciations 36.3 (disengagement)	No. of cases 13 Average risec -0.53 Average $v_{erog}$ -2.02 (compromise) Average renunciations 34.5 (disengagement)
<i>STRONG CONTRACT</i>	No. of cases 5 Average risec +0.37 Average $v_{erog}$ 2.22 (compromise) Average renunciations 27.6 (disengagement)	No. of cases 8 Average risec +0.88 Average $v_{erog}$ 1.15 (compromise) Average renunciations 20.0 (disengagement)

The index of delivery speed is significantly higher on average in the five cases with strong contract and weak leadership, as expected. The index of disengagement is greater when leadership is strong and contract is weak, as suggested by the theory.

To sum up, while performance of TPs cannot be interpreted on the basis of a linear hypothesis of leadership or contract influence, or of a simple cumulative interaction between these two variables, the theory outlined in this essay helps us to move forward. The hypothesis that leadership and

contract are complementary (and not substitutable) elements seems to be con-firmed by empirical evidence.

## Conclusion

The preliminary empirical application seems to encourage the theory advanced in this paper. This evidence will have to be much more carefully assessed through future empirical research. Should the results be confirmed, some general lessons could be drawn on how to build an efficient organization for producing innovation. In particular, there would be a strong argument to resist the natural tendency of leaders to avoid “obstacles” to their action, namely the use of contracts. Similarly, a strong argument could be made to resist the natural tendency of the actors in the innovation process to escape authority and leadership that could be seen as threats to their “democratic” dialogue.

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## IT Applications as a Didactic Tool in the Teaching of Math (Using of Spreadsheet to Programming)

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*In this document, we proposed a methodology to teach financial mathematics using a spreadsheet and computer platforms as a didactic tool. We describe the traditional education process in a specific topic of mathematics, “debt restructuring and modeling with equivalent-equation” from the theoretical explanation to design a financial simulator programmed in a spreadsheet. After this, the result will be verified and validated by the designed software.*

**Keywords:** ICT, Financial mathematics, Education-learning process, design financial tools

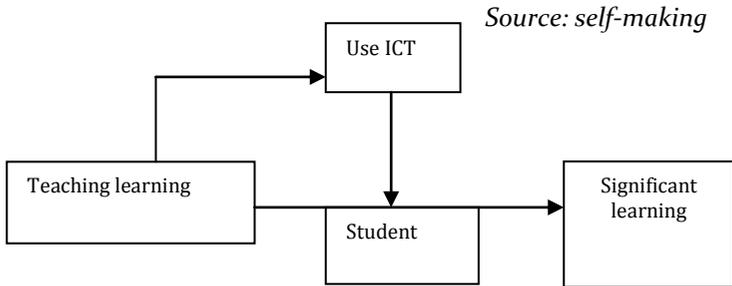
**JEL Classification:** C6, C63

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### Current situation

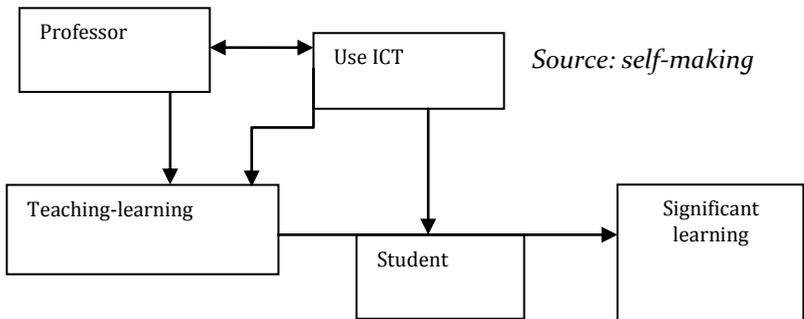
Nowadays, the teaching-learning process of mathematics has been positively influenced by the communication and information technologies, helping its evolution and growth. However, these technologies are design, administrated and executed by human beings, which means that the human hand is still above all. Before this, another question emerges, is it true that the use of information technologies have positively influenced the teaching-learning process of mathematics? Probably, the first answer could be ‘yes’,

and we actually believe that the use of new information technologies has significantly promoted the teaching-learning process. How to view this process as a first construct: (See figure 1)



**Figure 1:** Teaching-learning trough use of computer platforms

The influential variables are: the process (teaching-learning), the didactic resources (the ICT), and the product (significant learning). In fact, we can notice that the model adjusts to the initial approach. Nevertheless, in the traditional teaching-learning process, the professor is the main element, therefore this variable should be considered in the model. Now, the model has to be reconsidered as a new construct: (See figure 2)



**Figure 2:** Teaching-learning trough use of computer platforms

In traditional learning process the teachers was the main character, the root from which the knowledge is generated. For certain, the professor is the figure that has the experience and knowledge to guide the student. This is, from the explanation and activities that the teacher provides during classes, the students repeat the process and develop it. But, what happens

before this process? The student tends to push away from mathematics, so it is necessary to integrate new variables to the teaching-learning process in order to make it more attractive to the student.

These elements could be Excel spreadsheets (computer tools) in which it is possible to design series of calculations, which allows performing simulations with mathematical exercises (Garcia et al 2007, Nies: 2007).

## **The simulation and modeling in teaching-learning process**

The simulation is considered to be hardware and software configuration in which, through some algorithms, it can be reproduce the behavior of a particular physical process or system. In this process, the real situations are substituted by artificial design, from which we can learn actions, skills, habits and/or competitions; and then transfer them to real life situations with the same effectiveness. In this activity, not only theoretical information is accumulated, it is brought to the practice.

The simulators constitute a procedure, in general to the concepts of creation and construction of knowledge. This is done to apply this new context in which, for some reason, the student can't access the methodological context where knowledge is developed.

In this digital age, without a doubt, the potential in the use of computers and software for educational purposes is greatly recognize. Technological advances allow students, through computer simulation, face the learning situations that, for some physical and/or economical restrictions, could be difficult to experiment in a natural environment or in a laboratory. The computer simulation allows the construction of ideal scenarios, the manipulation of variables to observe its impact on certain phenomena or just to give an apprentice a teaching tool to replicate a theory learned. The influence of computer simulation for educational purposes has a broad spectrum, this, based on three main features:

- a) Its motivational part, because it permits the representation of phenomena to study it capturing the attention and interest of the student;
- b) Its facilitator to participate in the learning process, because the student interacts with him o her, helping the student to

- comprehend through the discovery and understanding of the phenomena, system or simulated process;
- c) And, finally the reinforcement part, this allows the student to apply the acquired knowledge, hence the generalization of it.

The simulation as a didactic strategy allows access to the construction of models in real situations that make easy the experimentation process. The use of simulation in the educational process, according to Abello, López and Sara (2003), allow training in real but controlled and secure environment; leaving out some difficult, expensive and hazardous aspects of a real life scenario that could be hard to reach.

And, with the benefit of repeating the experiment as many times possible, at a minimum cost.

The simulation in the educational process allows the alteration of time, with discretion, permitting the training in real time decision making that would carry on a certain action, without the waiting period.  
(See figure 3)



**Figure 3:** Kind of simulators to learn  
*Source: taken from Google image*

Simulation also makes possible the use of a scenario with a consistent hypothesis under certain conditions in which the real action or crisis eventually develops. Other benefits of simulation, according to quoted

authors, the use of images that create a graphic view about the situation in which they find themselves. If the expressed circumstances are given in a certain scenario, it is a good study to experiment the complex interactions that occur inside the system or organization that is under pressure.

With the same idea, simulation as a tool in the educational process makes it easy to create changes and alterations in the simulation model and observe the behavior of the users and its effects on these causes; it also helps to practice a forced procedure with new policies and rules of decisions. With this argument, we now discussed theoretical and empirical study.

## **Theoretical framework**

Goldenberg (2003) points out that, nowadays the trend that has major impact in education, is the one that is present in mathematics teaching and in the education process, with the use of information technologies (IT). Within this field, the use of computer spreadsheets has taken a major step forward in this topic.

The design of mathematical spreadsheet models began in 1979, when Dan Bricklin created "VisiCalc", using an Apple II computer. This fourth generation software allowed to automatically development financial projections, by only manipulating a few values. Based on this, the management and business sector had been favored in time and costs, because now the financial decisions are based on financial simulation procedures to determine the best alternative.

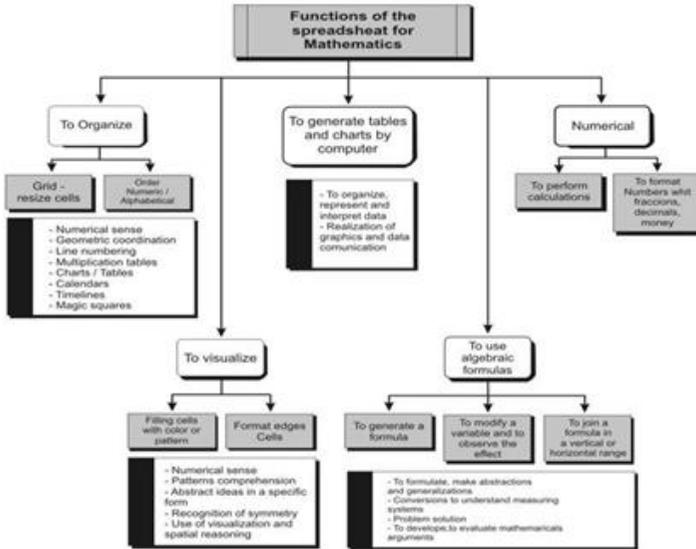
The success of the spreadsheets is based on the experience of the professionals who manipulate this software, but besides that, they can know the true problems of the company, and solve them through the use of mathematics.

Moursund (2003) says that in real life exists a striking contrast in the field of education, this means, that the introduction of IT in the teaching-learning process at a basic and medium level, focuses more in what the tool can develop instead of what it can solve. He also noted, in the case of solving management problems, in the exact and social sciences and other fields, the spreadsheet provides a good environment for modeling these problems.

Lewis (2007) reveals the importance of using spreadsheets and the commitment that teachers must promote its use, because it could contribute significantly to the teaching-learning process, for example in mathematics. He strengthens his argument by saying that the spreadsheet is a powerful tool for learning and developing student skills that enables them to:

- a) Organize data (sort, categorize, generalize, compare and highlight the key elements),
- b) Perform different types of graphical interpretation and analysis,
- c) Use graphics to reinforce the concept of percentages,
- d) Use specific visual elements with a view to exploring abstract mathematical concepts (visual and spatial intelligence),
- e) Discover patterns,
- f) Understand basic math concepts such as counting, addition and subtraction,
- g) Stimulate mental abilities by using logical formulas for conditional answer: "if ... Then " and finally ----
- h) Solving problems and using formulas to manipulate numbers, exploring how and which formulas can be used in a certain problem and how to change the variables that affect the outcome "(Lewis Op. Cit).

In figure 4, we can see all that has been described, but it also shows the process of logical functions generated by the use of spreadsheets; this could encourage the design of planning session with IT applications. Mainly, this is the most important event between the traditional way of teaching and the migration to the use of spreadsheets in the teaching of mathematics (See figure 4)



**Figure 4:** Functions of the spreadsheet

Source: Taken from lewis (2003) <http://www.eduteka.org/HojaCalculo2.php>

Finally we can include the history of mathematics in the classroom, like say Fauvel (1991), Clinard (1993), Bidwell (1993), Murugan (1995), Barbin (1997), Furinghetti (1997), Ernest (1998) and Jonasse (1998), as a methodological tool that could be helpful in learning.

### **The excel platform as a learning tool and the methodological development of the topic**

The use of IT and its benefits starting with the planning of sessions in an specific mathematical topic. Before this, it is programmed in an excel spreadsheet, other than the fact that this makes it easier to explain a mathematical topic, but also it also is going to constitute the design of a simulator that helps as a tool (as a product for the session). This event pretends to prove that mathematics, one of the sciences most rejected by students, in the teaching-learning process, the use of the TI could be an influential element in acceptance of mathematics by the student.

## Developing a theme

How we visualize a mathematical problem in a traditional way: Equivalent equation model (Traditional session). Valuation of debt: When we have more than one debt

Now, with compound interest formula (including capitalizations)

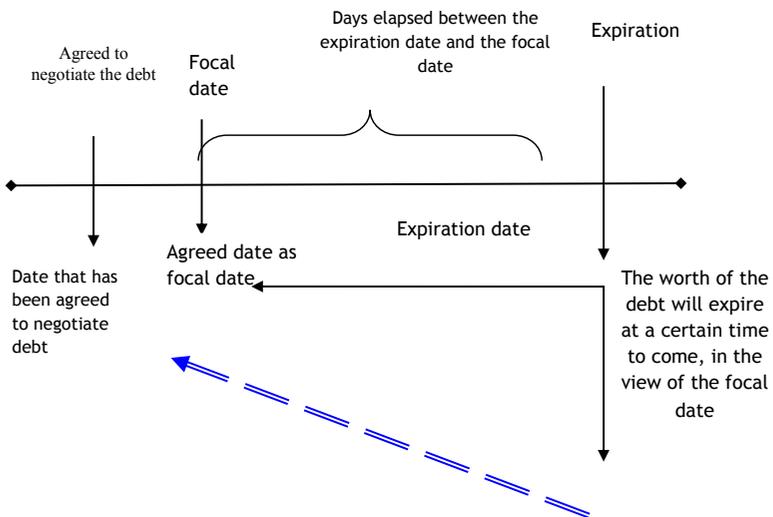
$$V_{D_o} = \frac{D o_1}{\left(1 + \frac{i_1 t_1}{365}\right)^m} \quad (2)$$

Valuation of debt: When we have more than one debt

$$V_{D_o} = \sum \frac{D o_1}{\left(1 + \frac{i_1 t_1}{365}\right)^m} + \dots + \frac{D o_n}{\left(1 + \frac{i_n t_n}{365}\right)^m} \quad (3)$$

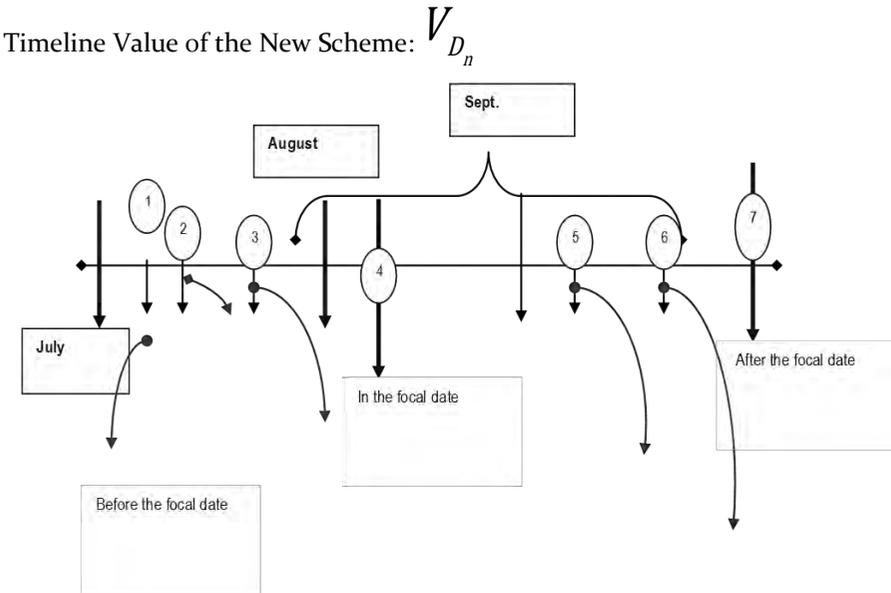
Following the generalization model, it's necessary to display a timeline for establishing moments: prior to the focal date (PDF), the focal date (FD), and subsequent to the focal date (SFD).

Timeline Value of the Original Scheme:  $V_{D_o}$



The elements for determining the value of the new scheme: VD are: the interest rates or discount in the renegotiation of the pacts  $i_{1..n}$  in the time  $t_1, \dots, t_n$ , the obligation before the focal date  $S_{1..n}$  (from 1 to n), in the focal date  $S_{ff}$  and the obligations after the focal date  $S_{pff}$  (from 1 to n).

The new scheme, from the renegotiation with "Y" equal payments on different dates, both prior to the focal date, in the focal date and after the focal date, they can be seen in a timeline:



The expression of the mathematical model of the New Debt, with the accurate Simple Interest, is as follows:

$$V_{D_n} = \sum_{0=n}^{aff} S_{1_{aff}} \left(1 + \frac{i_1 t_1}{365}\right) + \dots + S_n \left(1 + \frac{i_n t_n}{365}\right) + S_{ff} + \sum_{0=n}^{pff} \frac{S_{1_{pff}}}{\left(1 + \frac{i_1 t_1}{365}\right)} + \dots + \frac{S_{n_{pff}}}{\left(1 + \frac{i_n t_n}{365}\right)} \quad (4)$$

It is replaced:  $S_{1_{aff}}$ ,  $S_{ff}$  and  $S_{1_{pff}}$  by X

$$V_{D_n} = \sum_{0=n}^{aff} X_{1_{aff}} \left(1 + \frac{i_1 t_1}{365}\right) + \dots + X_n \left(1 + \frac{i_n t_n}{365}\right) + X_{ff} + \sum_{0=n}^{pff} \frac{X_{1_{pff}}}{\left(1 + \frac{i_1 t_1}{365}\right)} + \dots + \frac{X_{n_{pff}}}{\left(1 + \frac{i_n t_n}{365}\right)} \quad (5)$$

It is replaced:  $X_{1_{aff}}$   $X_{ff}$   $X_{1_{pff}}$  by the unity (1) to obtain the coefficients

$$V_{D_n} = \sum_{0=n}^{aff} 1_{1_{aff}} \left(1 + \frac{i_1 t_1}{365}\right) + \dots + 1_n \left(1 + \frac{i_n t_n}{365}\right) + 1_{ff} + \sum_{0=n}^{pff} \frac{1_{1_{pff}}}{\left(1 + \frac{i_1 t_1}{365}\right)} + \dots + \frac{1_{n_{pff}}}{\left(1 + \frac{i_n t_n}{365}\right)} \quad (6)$$

To reduce the expression of the mathematical model, we substitute the expression  $(1+i/365)$  of the accumulation factor by "Fa" resulting in the next expression

$$V_{D_n} = \sum_{0=n}^{aff} 1_{1_{aff}} (Fa) + \dots + 1_n (Fa) + 1_{ff} + \sum_{0=n}^{pff} \frac{1_{1_{pff}}}{(Fa)} + \dots + \frac{1_{n_{pff}}}{(Fa)} \quad (7)$$

If we identified the payments coefficients: before the focal date, within the focal date and after the focal date like:  $C_{aff}$ ,  $C_{ff}$ ,  $C_{pff}$

We obtained the next expression:

$$V_{D_n} = Y \left( \sum_{0=n}^{aff} C_{aff} + C_{ff} + \sum_{0=n}^{pff} C_{pff} \right) \quad (8)$$

Replacing, now we get the model expression that allows us to obtain the amount of each payment:

$$Y = \frac{V_{D_n}}{\sum_{0=n}^{aff} C_{aff} + C_{ff} + \sum_{0=n}^{pff} C_{pff}} \quad (9)$$

Where:

Y = Value of each payment,

$V_D$  = Value of the new debt previously valued,

$\sum C_{aff}$  Sum of the payments coefficients in the prior focal date,

$C_{ff}$ : Payments coefficients in the focal date.

$\sum C_{pff}$ . Sum of the payments coefficients after the focal date.

The expression of the mathematical model of the New Debt, with Compounded Interests accurate, is as follow:

$$V_{D_n} = \sum_{0=n}^{aff} S_{1_{aff}} \left(1 + \frac{i_1 t_1}{365}\right)^m + \dots + S_n \left(1 + \frac{i_n t_n}{365}\right)^m + S_{ff} + \sum_{0=n}^{pff} \frac{S_{1_{pff}}}{\left(1 + \frac{i_1 t_1}{365}\right)^m} + \dots + \frac{S_{n_{pff}}}{\left(1 + \frac{i_n t_n}{365}\right)^m} \quad (10)$$

To substitute:  $S_{1_{aff}}$ ,  $S_{ff}$  and  $S_{1_{pff}}$  by X

$$V_{D_n} = \sum_{0=n}^{aff} X_{1_{aff}} \left(1 + \frac{i_1 t_1}{365}\right)^m + \dots + X_n \left(1 + \frac{i_n t_n}{365}\right)^m + X_{ff} + \sum_{0=n}^{pff} \frac{X_{1_{pff}}}{\left(1 + \frac{i_1 t_1}{365}\right)^m} + \dots + \frac{X_{n_{pff}}}{\left(1 + \frac{i_n t_n}{365}\right)^m} \quad (11)$$

Again, we substituted:  $X_{1_{aff}}$ ,  $X_{ff}$  y  $X_{1_{pff}}$  by the unity (1) to obtain the coefficients

$$V_{D_n} = \sum_{0=n}^{aff} 1_{1_{aff}} \left(1 + \frac{i_1 t_1}{365}\right)^m + \dots + 1_n \left(1 + \frac{i_n t_n}{365}\right)^m + 1_{ff} + \sum_{0=n}^{pff} \frac{1_{1_{pff}}}{\left(1 + \frac{i_1 t_1}{365}\right)^m} + \dots + \frac{1_{n_{pff}}}{\left(1 + \frac{i_n t_n}{365}\right)^m} \quad (12)$$

To reduce the expression of the mathematical model, we substitute the expression  $(1+i_1/365)^m$  with the accumulation factor for  $(Fa)^m$  resulting in the next expression:

$$V_{D_n} = \sum_{0=n}^{aff} 1_{1_{aff}} (Fa)^m + \dots + 1_{n_{aff}} (Fa)^m + 1_{ff} + \sum_{0=n}^{pff} \frac{1_{1_{pff}}}{(Fa)^m} + \dots + \frac{1_{n_{pff}}}{(Fa)^m} \quad (13)$$

Again, if we identified the payments coefficients, before the focal date, in the focal date and after the focal date like:  $C_{aff}$ ,  $C_{ff}$ ,  $C_{pff}$

We obtain the following expression:

$$V_{D_n} = Y \left( \sum_{0=n}^{aff} C_{aff} + C_{ff} + \sum_{0=n}^{pff} C_{pff} \right) \quad (14)$$

Through substitution, we obtain the model expression that allows us to get the amount of each payment.

$$Y = \frac{V_{D_n}}{\sum_{0=n}^{aff} C_{aff} + C_{ff} + \sum_{0=n}^{pff} C_{pff}} \quad (15)$$

Where:

Y = Value of each payment,

VD = Value of the new debt previously valued,

∑Caff. = Sum of the payments coefficients in the prior focal date,

Cff = Payments coefficients in the focal date.

∑Cpff. =Sum of the payments coefficients after the focal date.

## Programming in excel spreadsheet

After explaining and practicing each subject of Financial Mathematics, the following step is now for the student to design their own group of formulas for this subject, in this case being equivalent equations with simple and compound interest. The cover is designed and inserted in the spreadsheets for any formula that we will use.

### Process of Teaching-Learning

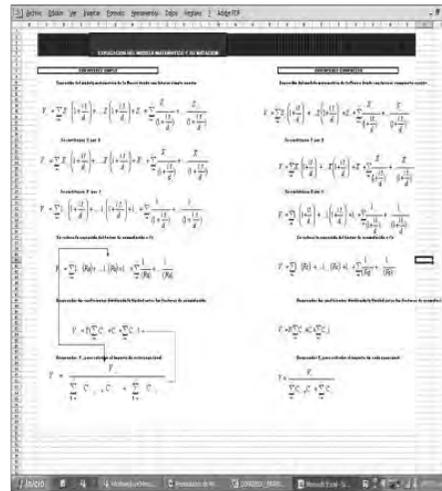
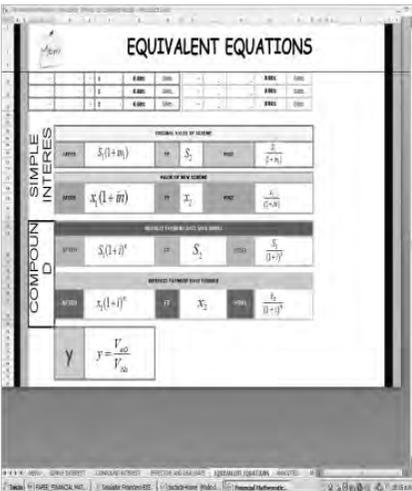
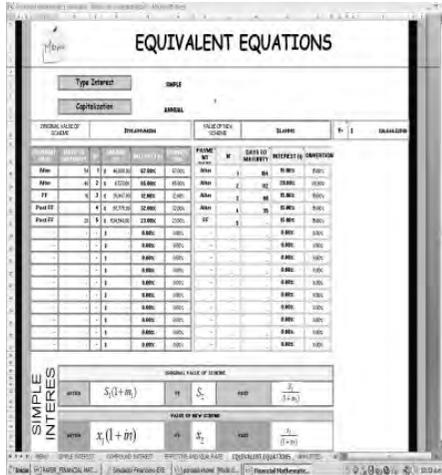
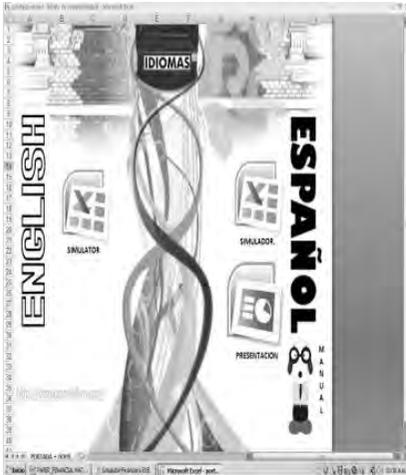
Step 1: The modalities are established (See sequence images)

Step 2: Programming the Excel spreadsheet for any formula (For example)

```
=IF(D7="1",(1*POWER(1+(K13*(D7/12)),D7)),0)+IF(F7="1",(1*POWER(1+(K13*(F7/12)),F7)),0)+IF(H7="1",(1*POWER(1+(K13*(H7/12)),H7)),0)+IF(J7="1",(1*POWER(1+(K13*(J7/12)),J7)),0)+IF(L7="1",(1*POWER(1+(K13*(L7/12)),L7)),0)+K19+IF(D11="1",(1/POWER(1+(D11/12)),D7)),0)+IF(F11="1",(1/POWER(1+(F11/12)),F7)),0)+IF(H11="1",(1/POWER(1+(H11/12)),H7)),0)+IF(J11="1",(1/POWER(1+(J11/12)),J7)),0)+IF(L11="1",(1/POWER(1+(L11/12)),L7)),0)+
```

Design tool (excel)

See sequence images



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## Discussion

The use of ICT for teaching mathematics has become a new trend. This is, through computing platforms have opened new ways in education, specifically in teaching mathematics. Some studies have given us evidence, to say that the population nowadays is getting better results, both in understanding and the skills of developing mathematical functions, with the use of the spreadsheets and computer technologies itself, all of that compared with the student that carries out the teaching-learning process in the traditional system<sup>1</sup>.

The uses of ICT have helped the manipulation of variables in mathematical information or data that is used for development of some formula or mathematical model. The graphic representation, the modeling and other qualities of this application, is what ICT offers for developing the exercises. Just as we know, a few practical mathematical cases turn to be very difficult or complex to solve in a traditional way, using only paper and pencil.

In the same way, it is necessary to break paradigms and old customs in the teaching-learning process; it has been recommended that the teacher designs his session plan with the use of computer technologies, being the specific case, the introduction of spreadsheets.

The bases of the proposed model (Figure 1 and 2) show variables: the teaching-learning process, the tool (the use of the ICT, specifically the spreadsheet) and the product (significant learning). In both cases the student is the subject, but the b) model integrated the teacher as an important variable.

In the final one, the character through which migration occurs from traditional education system of mathematics, towards the teaching-learning process based in the use of ICT, specifically the use of Excel spreadsheets.

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<sup>1</sup> SRI International, "A Review of Research on Computer-Based Tools (Spreadsheets, Graphing, Data Analysis, and Probability Tools), with an Annotated Bibliography"  
[www.sri.com/policy/ctl/assets/images/Tools\\_review.pdf](http://www.sri.com/policy/ctl/assets/images/Tools_review.pdf)

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## Innovation Activities in the Service Sector: Empirical Evidence from Portuguese Firms

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*This research aims to analyze the degree of importance of investment and expenditure on innovation activities for entrepreneurial innovative capability, in the scope of Portuguese services firms. The literature review considers three main approaches regarding service innovation: assimilation, demarcation and synthesis. A conceptual model was proposed and several research hypotheses were empirically tested using secondary data, belonging to the 4th CIS 4, supervised by EUROSTAT. The method used will be the logistic regression model. According to the results obtained, the greater the financial investment in acquisition of machinery, equipment and software, in internal research and development, in acquisition of external knowledge, in marketing activities and other procedures, the greater the propensity for firms to innovate in terms of services. This study highlights the contributions that innovation activities can provide in what regards the development of innovation process, giving special emphasis to their service innovation.*

**Keywords:** *Innovation, Services, Entrepreneurial Innovative Capability, CIS*

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## Introduction

In the last decades, we have seen an evolution of the service sector's role in the economy, its relevance increasing in innovation, competitiveness, employment and economic growth (Hauknes, 1998; de Jong, Bruins, Dolfsma and Meijaard, 2003; Howells and Tether, 2004; Tether, 2005). A study carried out in the European Union corroborates these facts, since in 2004, service sector, on average, accounted for 39,9% of total employment in the EU-25 and for 46,2% of added value (Arundel, Kanerva, Cruysen, Hollanders, 2007). From the growing importance of this sector, it becomes important to analyze the determinant factors of innovative capability in firms in general and service firms in particular.

This study aims to analyze the degree of importance of investment and expenditure on innovative activities for the innovative capability of service firms. Other studies (Author, 2003, 2009), analyzed some determinants that presented a significant impact on industrial firms' innovative capability, but for services the factors stimulating and restricting entrepreneurial innovative capability have yet to be identified and analyzed. The paper takes as reference the approaches to innovation in service. Considering this conceptual framework, this investigation intends to elaborate an empirical support to allow identification and analysis of the factors that affect innovative activity and performance in Portuguese service firms, more precisely in terms of innovative activities.

To test empirically the hypotheses formulated, use is made of secondary data supplied by the "Higher Education and Science Observatory" (OCES), belonging to the 4th Community Innovation Survey (CIS 4). This questionnaire was implemented under the supervision of EUROSTAT. To the data obtained, we apply the model of generalized linear regression, namely the logistic regression model.

The study is structured as follows: point two reviews the relevant literature on the subject of innovation in services and based on this, formulation of the hypotheses we intend to test empirically in the statistical model. Point three defines the sample and goes on to describe and characterize the variables used in the empirical study, with presentation of the logistic regression model. Point four analyzes the data. The final point

presents final considerations and suggests that future investigations are carried out.

## Literature Review

The importance of the innovation process in services is widely recognized, both theoretically and empirically, but the heterogeneity of the service sector and the lack of an innovation typology that allows integration of that diversity make theoretical teaching and empirical analyses difficult. The literature demonstrates a growing interest in the study of innovation in services. The service sector covers a wide range of different activities with greatly differentiating characteristics (Hauknes, 1998; Drejer, 2004; Hipp and Grupp, 2005; Miles, 2005; Vries, 2006; Más-Verdú, 2007; Mainardes, Silva and Domingues, 2010).

According to Miles (2005: 444), “despite services being defined differently by different authors, common characteristics are pointed out in the literature on innovation in services”. Many services are characterized by intangibility, inseparability, interactivity and variability, as well as weak protection of intellectual property.

Theoretical approaches to innovation in services have developed rapidly in recent decades (Sundbo, 1997; Grönroos, 2000; Miozzo and Soete, 2001; Miles, 2008) and can be grouped in the following approaches: negligence, assimilation, demarcation, and later, the synthesis approach (Haukens, 1998; Gallouj, 1998; Sundbo and Gallouj, 1998; Freeman and Louçã, 2001; Coombs and Miles, 2000; Gallouj, 2002; Howells and Tether, 2004; Drejer, 2004; Miles, 2005; Vries, 2006). Studies about innovation in services are relatively new and were categorized in four groups according to their respective approaches.

These approaches reveal that innovation in services differs from innovation in products. According to Sundbo (1997) and Tether and Hipp (2002), the very characteristics of services (intangibility, heterogeneity, perishability and simultaneity of production and consumption) which distinguish them from physical products, bring difficulties and restrictions to the importing of management programmes and models directed towards innovation in the industrial sector. Services have such particularities that

they require specific innovation models for the sector, something which is still scarce in the literature (Barras, 1986, 1990; Gallouj, 1998, 2002; Pires, Sarkar and Carvalho, 2008).

From a approach of services as a not very innovative sector that “absorbed” innovation from the manufacturing sector, various authors and organizations have considered services as possessing their own forms of innovation, and in some cases, with high levels of innovation (Evangelista, 2006; OECD, 2007; Brax, 2007). The increased interest in investigating the service sector has been obvious in recent decades, aiming to develop the necessary knowledge for increased productivity and innovation in this sector (Grönroos, 2000; Hertog, Broersma, Ark and Van, 2003).

The results of the innovation process are called entrepreneurial innovative capability. Therefore, this investigation adopted the term of entrepreneurial innovative capability to integrate the various components arising from the process of firm innovation, namely product innovation, process innovation, organizational innovation and marketing innovation (OCDE, 2005). This study is restricted to entrepreneurial innovative capability in terms of product or service. Therefore, the firm is considered innovative if in the period 2002-2004, it introduced any new or technologically improved product or service. Product or service innovation is defined as “the market introduction of a new good or a significantly improved good or service with respect to its capabilities, such as improved software, user friendliness, components or sub-systems” (CIS 4, 2005:9).

The literature review made in the area of firm innovation stresses that innovative capability varies from one firm to another, and is determined by a vast and complex number of factors, which both stimulate and limit the process of entrepreneurial innovation. Factors explaining innovation are not limited to the factors referred to here. However, intending to analyze the process of entrepreneurial innovation and considering the literature review carried out, this study highlights factors related to innovative activities. Other factors were taken into account, such as: firm size, sector of activity considering the various service sub-sectors. The innovative activities and expenditure to be studied in this investigation arise from those defined by the Innovation Survey CIS 4 (2004:5).

The importance of investment and expenditure on innovation activities in firms such as machinery, and equipment, software and external knowledge, is demonstrated in the studies by Mansfield (1988), Shields and Young (1994), Archibugi, Evangelista and Simonetti (1995), Weiss (2003), Camacho and Rodriguez (2005), Canepa and Stoneman (2008), Elche and González (2008) and Un, Romero-Martínez and Montoro-Sánchez (2010). According to these authors, firms that invest more in investigation and development and in improving structures and collaborators' competences acquire greater technological capacity, and consequently have the capability to produce more innovations. Therefore, they argue that firms that invest in better structures, technology and qualified staff show greater innovative capability. So the following relationship between investment and expenditure on innovation activities and entrepreneurial innovative capability is established:

*Hypothesis 1: investment and expenditure on innovation activities is positively related to service firms' propensity to innovate in terms of products/ services*

Based on the generic hypothesis related to investment and expenditure on innovation activities and to the typology presented in the Innovation Survey CIS 4, according to Table 2, the following seven specific hypotheses are formulated in this context:

- H11: Carrying out internal R&D activities is positively related to service firms' propensity to innovate in terms of products/services.*
- H12: Carrying out external activities of R&D is positively related to service firms' propensity to innovate in terms of products/services.*
- H13: Acquisition of machinery, equipment and software is positively related to service firms' propensity to innovate in terms of products/services.*
- H14: Acquisition of other external knowledge is positively related to service firms' propensity to innovate in terms of products/services.*
- H15: Carrying out training is positively related to service firms' propensity to innovate in terms of products/services.*
- H16: Carrying out marketing activities is positively related to service firms' propensity to innovate in terms of products/services.*

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*H17: Investment and expenditure in other procedures is positively related to service firms' propensity to innovate in terms of products/services.*

The relationship between the factor of firm size and entrepreneurial innovative capability is widely discussed in the literature, and two perspectives are found. On one hand, Schumpeter (1942) and Vrande et al. (2009) found a positive association between firm size and entrepreneurial innovative capability. The results show that large firms have advantages in terms of innovation compared to small firms, in that they possess more knowledge and more qualified resources. On the other hand, studies made by Sengenberger and Pyke, (1992), Rothwell and Dodgson, (1994) and Tidd, Bessant and Pavitt, (1997) identified negative effects of firm size on entrepreneurial innovative capability. Kim et al. (2009) add to this, stating that small firms, due to greater proximity and contact with the market, have a greater propensity to develop innovative activities. It seems important, therefore, to clarify the relationship between firm size and innovative capability, and so the following hypothesis is formulated:

*H2: Larger service firms have a greater propensity to innovate in terms of services, than smaller firms*

The factor of sector of activity is a classic in studies of firm innovation. The sector of activity's influence on firms' innovative capability is highlighted in various studies (Fritsch and Lukas, 2001; Kaufmann and Tödtling, 2001; Bayona, García-Marco, Huerta, 2001; Tsai, 2001; Romijn and Albaladejo, 2002; Tether, 2002). It is expected that firms belonging to sectors of activity based on technology, such as electronics and computing, innovate more than firms belonging to other sectors of activity. In this investigation, the basis for analysis of sector of activity follows the classification proposed by NACE (Nomenclature of Economic Activities in the European Community). Based on the division made by Furrer and Sollberger (2007), considered as services with a technological basis are those such as communications, computing and related activities, research and development, architectural and engineering activities, and technical testing and analysis. The remaining services, such as hotel and catering, transport,

banks and insurance are services where the main agent is the individual. This being so, the following hypothesis is presented:

*H3: Firms in service sub-sectors based on technology have a greater propensity to innovate in terms of services, than firms belonging to other sectors.*

The hypotheses formulated here were tested empirically bearing in mind the investigation design presented below.

## **Research Design**

### **Population, Sample and Data**

The data used in this research are secondary data, collected through a survey that consisted of a questionnaire named Community Innovation Survey IV – CIS 4 between June and November 2005. In Portugal, the survey was conducted by OCES – Observatório da Ciência e do Ensino Superior (Higher Education and Science Observatory), in collaboration with INE – Instituto Nacional de Estatística (National Institute of Statistics), according to EUROSTAT'S methodological specifications, and concerning innovative activities of Portuguese firms during the period 2002 to 2004.

The population contemplates all service firms according to the classification of economic activities CAE – Rev. 2.1. (CAE, 2003). The sample considered 4.815 firms replied to the questionnaire, giving a 74, 3% response rate (OCES, 2006). From the firms in the sample, only 1306 firms belonging to the services sector are considered.

Thus, service sector firms will be considered innovative in their services, if they introduce new or technologically improved services during the period 2002-2004.

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## Description and data characterization

### Dependent and Independent Variables

In this study, innovative capability is measured from the information collected in terms of service innovation, which is considered as the dependent variable. This dimension is presented as a dichotomic binary variable with the value of 0 if the firm did not innovate and 1 for those that innovated. Independent variables are internal R&D activities, external acquisition of R&D, acquisition of machinery, equipment and software, acquisition of other external knowledge and other procedures. Based on the data referring to the variable, the value of “1” is adopted when firms undertake any of the R&D activities specified and the value of “0” otherwise. It should be noted that these variables were also used in the studies by Kaufmann and Tödting (2001), Author (2003), Author et. al, (2008), Harris and Li (2009), Millot (2009).

### Control Variables

Just as in other studies, (Nieto and Santamaria, 2007 and Author, 2009) this investigation used some control variables directly linked to business characteristics, such as firm size and sector of activity. Concerning the second variable, this investigation uses the Service activity sub-sector. For that variable, the typology of Furrer and Sollberger (2007) is used, creating two variables corresponding to levels of intensity: technologically based services and services centred on the individual. The value of one of the two categories is attributed to each firm, according to the service activity sub-sector it belongs to.

To measure Firm Size, four variables were created: (1) micro-firm: 5-9 collaborators; (2) small firm: 10-49 collaborators; (3) medium-sized firm: 50-249 collaborators and (4) large firm: with 250 or more collaborators.

### Method: Logistic Regression Model

From the theoretical literature review and the proposed conceptual model, it was found that a firm’s innovative capability is a complex

phenomenon influenced by a wide range of factors. Since it is necessary to explore the relationship between these factors and innovative capability, the intention is to study, more specifically, the statistical relationship of a dependent variable in relation to more than one explanatory variable; the Logistic Regression Model (Logit Model) was decided on. In the dimension of services' innovative capability, there is a correspondent regression model where the dependent variable is dichotomic, so according to Hair, Babin, Money and Samouel, (2003) the best application model is the Logit regression model. This has been the most widely used model in empirical studies carried out (Kaufmann and Tödtling, 2001; Author, 2003), and is presented as an appropriate analytical technique for proposed conceptual models, since these include a dependent categorical variable (binary or dichotomic) and several independent variables. The estimation process is based on the maximum likelihood procedure and takes into consideration the following model specification

$$IS_i = \beta_0 + \beta_{11}Adi_1 + \beta_{12}Adi_2 + \beta_{13}Adi_3 + \beta_{14}Adi_4 + \beta_{15}Adi_5 + \beta_{16}Adi_6 + \beta_{17}Adi_7 + \beta_{21}Dim_1 + \beta_{22}Dim_2 + \beta_{23}Dim_3 + \beta_{62}Dim_4 + \beta_{31}S_1 + \beta_{32}S_2 + \varepsilon_i$$

Where: IS = Services Innovation;  $\varepsilon_i$  = Error term;  $\beta$  = Coefficients; Adii = Investment and expenditure on innovation activities; Dimi = Firm size; Si = sector de activity in services. What: Adi1= Intramural (in-house) R&D; Adi2= Extramural R&D; Adi3= Acquisition of machinery, equipment and software; Adi4= Acquisition of other external knowledge; Adi5= Training; Adi6= Marketing activities; Adi7= Other procedures.

## Results and Discussion

At this stage of the research, logistic regression models were applied to the Community Innovation Survey, to test the proposed model. The Wald statistic was used as the testing statistic to analyze the behavior of variables and the adjustment quality of the proposed model.

Logistic regression results show that not all regression parameter estimates are statistically significant at a level of 5%. Regarding adjustment quality of the model, the results show that the predictive capacity of the model is 84,9%, which results from comparison of the values of the variable response values predicted by the model and those observed. The  $\chi^2$  statistic test has a value of 531,35 with proof value less than the significance level of 0,05. The log-likelihood statistics, with a value of 703,24, corroborate the global significance of the model.

Concerning the generic hypothesis H<sub>1</sub>, which aimed to test the effects of investment in innovation on innovative propensity in terms of services, a positive relationship with significance under 0,05 was found when a service firm makes investment in internal investigation and development activities (variable *Adi1*), acquisition of machinery, equipment and software (*Adi3*), acquisition of external knowledge (*Adi4*), in marketing activities (*Adi6*), and other procedures (*Adi7*), it presents a greater propensity to innovate in terms of services. The other factors (external acquisition of R&D and training) are not seen to be significant at 0,05 level. Considering the results obtained and those presented in column *Exp(B)*, it is observed that by investing in the acquisition of machinery, equipment and software (6,425), and internal investment in innovation (4,985), as well as implementing marketing activities (2,563), and other procedures for developing new products (2,113) and also acquiring external knowledge (1,752), service firms are seen to be more likely to innovate in terms of services. From the significance of the values obtained, the results show that investments in acquisition of machinery, equipment and software and internal investment in innovation are those which stimulate the propensity for service firms to innovate most.

Hypothesis H<sub>2</sub>, established an association between firm size and the propensity for firms to innovate in terms of services. Four classifications were considered for the sample firms, namely: micro, small, medium-sized and large. Firms considered as large (*Dim4*) were excluded from the analysis, as there were too few cases carry out logistic regression interactions. Testing the micro, small and medium-sized firms showed that the first (*Dim1*) did not present statistically significant results. However, small firms (*Dim2*) and medium-sized firms (*Dim3*) were positively related to the propensity for firms to innovate in terms of services (lower significance, respectively 0,1 and 0,05). Therefore, observing the values of *Exp(B)*, it seems we can state that the bigger the firm, the greater the propensity to innovate in terms of services.

Hypothesis H<sub>3</sub> related innovation in terms of services to service activity sectors, differentiating service firms based on high technology from low technology firms. This hypothesis was seen to be significant at a level under 0,1 and with a positive effect. Therefore, according to the division made by Fuller and Sollberger (2007), service firms in communications,

computing, investigation and development, architectural and engineering activities, and technical testing and analysis have a greater propensity to innovate in terms of services than firms connected to other sectors.

## Final considerations

The aim of this study was to investigate the degree of importance of factors determining entrepreneurial innovative capability, in the context of Portuguese service firms. With the purpose of improving comprehension of innovation in services and identifying the main determinants of innovation in the service sector in the area of innovation activities, various hypotheses for investigation were formulated based on the literature review carried out of innovation in services. The literature review identified three fundamental approaches in the sphere of service innovation: assimilation, demarcation and synthesis.

This investigation highlights seven factors stimulating and limiting innovative capability in firm: investment in innovation activities, firm size and sub-sector of service sector activity. It was in relation to these factors that the various hypotheses tested empirically were formulated.

The results of the model indicate that service firms based on technology are more likely to innovate in products/services than firms providing other types of services. According to the results obtained, some investments in innovation present positive and significant effects in service innovation; therefore, the greater the financial investment in acquisition of machinery, equipment and software, in internal research and development, in acquisition of external knowledge, in marketing activities and other procedures, the greater the propensity for firms to innovate in terms of services. The results of the model show that size has a positive and increasing effect on service innovation, despite large firms not being included in the interaction process of the *logit* Model. According to the results, we can say that medium-sized firms have a greater propensity to innovate in services than small firms do.

The principle contribution of this research lies in inclusion in the study of factors determining the innovative capability of service firms, seeking to increase comprehension of innovation in services and identify the main factors stimulating innovation in this sector. The investigation

proposed an empirical study based on a *logit* model, for joint analysis that provided measurement of the direct and indirect effects of a selected set of explanatory variables of the innovative capability of Portuguese service firms.

The main limitations of this study arise from the limited data obtained, through lack of access to all the results of CIS 4, for example, the number of employees per firm. Nor was it possible to draw up a comparison of results, with previous CIS, so as to assess evolutionary tendencies in the area of innovation activities and expenditure.

To continue this investigation, in future work it is proposed to repeat the empirical study with data from other European countries where the fourth Community Innovation Survey – CIS 4 was carried out. In addition, a new study will be developed with the proposed conceptual model, with the aim of contrasting empirically data from the Community Innovation Survey 2006 – CIS 2006. From this perspective, it is considered that repetition of the investigation in Europe, more precisely in countries that responded to the same questionnaires, could also enrich study of the phenomenon of entrepreneurial innovation, and specifically the approach to service sector innovation.

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## The Characteristics of Foreign Direct Investments in Serbia

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*The international movement of capital takes place in three main forms, namely: international mobility of credit capital, portfolio investments and foreign direct investments. Foreign direct investments (Greenfield investments) today are considered as the most desirable form of international capital. They represent such type of capital investment in the company through which ownership control over the company is being acquired. Direct investment of capital can be made in the existing company (modernization, expansion, etc.) abroad, or in the construction of a new capacities ("Greenfield investment"). In both cases the capital owner decides where to invest capital, how to organize production, takes care of the conditions of placements, the financial results of operations and the like, but also bears the risk of doing business. Therefore, foreign direct investments carry the highest business risk, but also bring the most revenue or profit. Foreign direct investments (FDI) play a key role in economic development. When it comes to the exporting countries, export of capital allows increased use of capacities, expansion of markets and new technology development, and essentially comes down to profit maximization, especially in medium and long term. When it comes to importing countries, import of capital provides an additional accumulation, transfer of new technologies and know-how without need to purchase a license, higher exports, the ability to finance new investments which affects the growth of employment, income, labor productivity, increase of budget revenues and other effects.*

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*The paper analyzes the main characteristics of FDI in Serbia.*

**Keywords:** *foreign direct investments, investments in Serbia*

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In the contemporary conditions of financial crisis, direct investments mean, more specifically, expansion of existing and establishment of new economic organizations of the so-called parent company. It is a long-term investment of corporate capital abroad. However, in direct investments, where, based on a rule, not only capital is being exported, but also technical and technological processes, know-how, work organization and so forth, the owner of capital reserves both function of ownership as well as the management function, i.e. Exporter of capital organizes and controllers the use of capital. There are several forms of capital investment in the form of foreign direct investments. For example, forms of foreign direct investments are so-called Greenfield investments, which include the complete construction of production facilities ("on the wasteland") in other countries, and mergers and acquisitions, i.e. investment through mergers and takeovers. Mergers represent joining of two or more separate and independent international companies in the new entity. The acquisition involves merging of foreign company by its purchase, in which way the company that was merged gets a new owner and a new management.

Greenfield FDI as investments in foundation of new companies and factories without supporting infrastructure, contribute to increasing the production capacities of a country and hiring new employees, and are therefore of special importance for countries in transition. They have a significant effect on increasing the total investment, but it is difficult to attract them, because they are more sensitive to the investment climate. With mergers and acquisitions, there is a change of ownership of existing resources, so this form of investment does not lead to increase in output and employment. It may even happen that in the initial period there is a reduction in capacity and release a number of workers. However, mergers and acquisitions may cause an increase in total investment in the future and contribute significantly to the country's economic growth through

improving the operation of companies and technology transfer. Also, this type of investment can solve the problem of survival of domestic firms that are dealing with bankruptcy. A particular challenge for investors are abandoned and neglected sites and buildings, mostly in urban areas, so called brown field investments. After a long period of inactivity, building land becomes ecological, social and also aesthetic problem of the city. Therefore, through appropriate policies and instruments investors should be encouraged to re-enable the use of existing industrial facilities and sites where there is already existing infrastructure. Investors can invest capital in the form of joint venture as well.

For example, one of the classifications of FDI, which originates from the World Bank, is the partition according to the investment motives. According to this division, for the purposes of determining the target group of investors, there are:

- a) Investments that require resources (investments that require natural resources such as minerals, raw materials and agricultural products; investments that require less expensive or specialized labor force);
- b) Investments that require market (investments coming to the markets where the imports of certain products are high; investments that track movement of its customers - large companies; investments that track specific market trends and engage local suppliers);
- c) Investments that require increase of production productivity, including the rationalization of production, or linkage of manufacturing operations with other companies aiming to reduce costs and / or specialize production, and finally;
- d) Investments that require existing capacities in order to maintain and promote long-term goals of their company.

Motives for the export of capital in the form of direct investment are different. The aim is to achieve high profits and to provide raw materials and energy basis, in order to ensure the continuity of domestic production. Also, the goal may be to produce final goods using raw materials, that are then being sold at high prices in the country from which the raw materials were imported, or to realize high profits by selling these products at the global

market, because the demand for them is great and prices are very high. The motives can be also seen in import substitution opportunities, economies of scale, avoidance of tariff barriers, creating new space for its activities, the achievement of economic and political dominance, the provision of military-strategic objectives and so on.

## **Inflow Level of Foreign Direct Investments**

Ambient, or adequate conditions for the inflow of FDI in Serbia, are still not favorable in a way of attracting investors in a greater volume. The legal framework for foreign investments consists of a large number of national and international principles and rules that must be fully aligned<sup>1</sup>.

The inflow of foreign capital in Serbia is conditioned both by the interests of investors and users. Yet, since 2001 Serbia catches up with other countries in the region in the most important aspects of the transition process. In this sense, FDI have a significant impact on the Serbian economy, by increasing competitive pressure on the domestic market, linking with local producers, improving human capital, affecting the balance of payments etc.

However, since year 2000 Serbia records an increasing inflow of FDI. The record was achieved in 2006, as it was also the case in the region, and it is not expected for this record to be soon repeated or surpassed<sup>2</sup>. The

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<sup>1</sup> However, the existing legal and institutional framework for foreign investments in Serbia is still incomplete. Basic current rules that allow foreign investments are Constitution of Republic of Serbia and the Privatization Law. Also, directly or indirectly, foreign investments are allowed by the Law on Foreign Trade, the Law on Securities, the Law on stock exchanges and stock brokers, the Law on Free Zones, the Law on Concessions and so on

<sup>2</sup> The Record in FDI inflow in 2006. was achieved as a result of the sale of Mobtel. The amount of FDI in 2000. was only 52 million US dollars, and from year to year records growing trend: 2001. - 177; 2002. - 495, 2003. - 1356. However, a mild decline has occurred in 2004. when the amount of FDI in Serbia is 962 million of US dollars. But in the next year (2005.) it reaches 1 572 million US dollars, and continues the trend of growth, and so in the fore mentioned 2006. reaches the culmination of 4 349 million dollars, followed by 3 462 dollars in 2007., 2 994 millions in 2008. The most important FDI were attracted in the field of financial mediation, manufacturing industry, telecommunications, trade etc., and minimum amount the area of

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current financial crisis largely contributed to this, and in 2009. Occurred a drastic fall in investments, not only in Serbia but also in other countries of the region. Therefore, the question is how to make Serbia attractive for a large volume of foreign direct investments<sup>3</sup>. According to the World Bank data, Serbia, for example, had greater FDI than Croatia (thanks to the sale of Mobtel to Telenor worth 1.5 billion Euros), while in 2007 and 2008. Croatia made a significant positive difference compared to Serbia. However, if the data on net inflows of FDI were observed in the two countries from 2000. to 2005. We could see that the difference in favor of Croatia would not be as great as in 2007. and in 2008. Inevitably, question is what led to these changes? It is certainly not the fact that infrastructure is better in Croatia than in Serbia, because then the investments would be much lower in Romania and Bulgaria, which have even worse infrastructure than Serbia. Many experts believe that the answer is in a greater political stability in Croatia than in Serbia, and therefore that is a basic condition that needs to be satisfied in order to make the inflow of FDI more significant (Croatia became a candidate for the EU in 2004 and for NATO in 2007.). On the other hand, Serbia and Croatia should be concerned with data that net FDI in Bulgaria and Romania individually is higher than in Serbia and Croatia together, and not only in the last three years of investment. Investment boom in these two countries starts from 2004 (Romania) and 2005 (Bulgaria). Both countries are members of the European Union and NATO since 2007.

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public administration and social security. Before the global economic crisis started, it was estimated that in 2009. Serbia could attract total investment in value of about three billion euros, but the current pace indicates that the inflow of investments will be significantly lower.

<sup>3</sup> According to gross income of foreign direct investment in the region, Serbia is in fourth place, just behind Romania, Bulgaria and Croatia (*"The international business sector in Serbia"*, Conference, Belgrade, June, 2010)

**Table 1:** Foreign direct investment (net inflows in billions of dollars)

Country	2006	2007	2008
Serbia	4.5	3.45	2.99
Croatia	3.46	4.99	4.80
Bulgaria	7.76	11.71	9.20
Romania	11.39	9.93	13.90

Source: World Bank, May 2010

In recent years, Serbia has created a very good and competitive tax system, which is considered to be by far the most competitive among countries in the region. This claim seeks a foothold in the comparative analysis of tax rates observed in the four countries.

**Table 2:** Taxes and contributions by countries of the region

Country	Monthly income tax	Compulsory social security contributions	TOTAL	Annual personal income tax	Corporate income tax	VAT
Serbia	12%	35.8%	47.8%	10%	10%	18%
Croatia	-	31.6%	31.6%	10%	10%	20%
Bulgaria	-	45.7%	45.7%	16%	16%	19%
Romania	15%	37.2%	52.2%	15 <sup>0</sup> -	20%	20%

Source: World Bank, May 2010

Table of taxes and contributions by countries of the region shows comparative advantage of Serbia when it comes to VAT, and when it comes to income tax, then Serbia and Bulgaria have a comparative advantage over Romania. Croatia is under all sorts of taxes in the studied group non-competitive and expensive. However, when we move into the field of taxes and contributions on salaries of employees then it is Bulgaria, with this aspect, which is the cheapest, which applies to the net income of employees too.

Size of net income is also one of the factors in the calculation of investment justification. Serbia is more favorable than Romania in terms of level of tax rates, but not so much that it would be a decisive factor for investors.

## Characteristics of FDI In Serbia Based On Swot Analysis

Modern SWOT analysis, as an important technique for identifying strengths and weaknesses, and examining opportunities and threats, can be also applied at the macroeconomic level<sup>4</sup>. In fact, we should analyze the economic environment in terms of attracting foreign direct investments (uncertain economic environment and low level of competitiveness, of course, do not attract foreign investors, on the contrary). However, external and internal aspects of the SWOT analysis of the investment potential of Serbia are numerous, where all advantage can convert into an opportunity and weakness can occur as a threat and endangering of achieved<sup>5</sup>.

As the **Advantages / Strengths (S)** can be noted:

- clear goals (entering the European Union and WTO),
- relative macroeconomic stability,
- Human resources (low cost of skilled labor, high-quality technical staff, etc)
- access to economies of scale,
- regionally competitive financial risk,
- restructured and privatized banking sector,
- accelerated development of capital market,
- contribution to the development of telecommunications infrastructure,
- liberalized system of tariffs,
- geographical factors (proximity to EU market),
- accelerated development of the private sector,

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<sup>4</sup> SWOT is an acronym of English words: strengths, weaknesses, opportunities and threats

<sup>5</sup> Kragulj D., CEFTA – Razvojne šanse i izazovi zemalja Jugoistočne Evrope u procesu evropskih integracija, in the monograph *Savremeni trendovi u razvoju menadžmenta*, FON, Beograd, 2007. str.312-319. ISBN 978-86-7680-135-0

- significant level of achieved stimulating fiscal, regulatory and financial measures (competitive in the region),
- adoption of Strategy for encouraging and developing Foreign Investment by the Government of the Republic Serbia and so on.

**Weaknesses (W)** are as follows:

- inadequate economic structure,
- monopolized economy,
- under-developed infrastructure,
- inflexible labor market,
- insufficient use of production capacities and outdated technology,
- poor liquidity and profitability,
- limited domestic consumption,
- bad market image,
- outflow of skilled personnel abroad,
- uneven regional development,
- corruption - lack of transparency of institutions and procedures,
- administrative barriers,
- implementation gap - lack of effective enforcement of basic laws that apply to foreign investors
- problem of functioning of rule of law,
- lack of clear national program to promote investment etc.

**Opportunities (O)** that are opening are:

- Free trade zone with countries of South East Europe
- Integration into the European Union,
- Fast market growth and entrance to new markets,
- strengthening of macroeconomic stability,
- Sustainable growth of GDP,
- the ability to move toward more dynamic and profitable industries,
- better use of available human resources,
- adjust the structure of employment needs of foreign investors,
- accelerated development and strengthening of institutions for FDI

- the implementation of laws regulating new types of risk,
- Government's commitment to Serbian program of sustainable economic development, etc

**Obstacles / Threats (T)** is numerous:

- low level of economic development,
- delays in the transition process,
- delays in the process of integration into the European Union,
- entry of new competitors in their own markets,
- "War of fiscal stimulus measures" in the countries of the SEE region
- inflexibility of labor market,
- adverse demographic changes,
- low level of reinvestment and the potential outflow of foreign capital,
- lack of transparency and inefficiency of the administrative system,
- political instability and so on.

## **Security of Investment**

In the future attraction of foreign direct investments in Serbia will be one of the main challenges of Serbian economic policy. Especially bearing in mind that the processes of privatization are at the end, and attraction of FDI is becoming a major challenge, especially bearing in mind the necessity that Serbian economy primarily relies on a new Greenfield investment. However, even though it comes to economic challenge, the key to this problem still lies in the legal and social sphere. In fact, efficient and profitable activity cannot stand uncertainty. Therefore, the basic precondition for any serious investor, both foreign and domestic, to be willing to invest - is security of investment. First of all, the legal security of property and investments, then the security of compliance with laws and contracts, debt collection, etc.

However, one should not ignore the corruption which is in Serbia over the level of countries in the region. Corruption is present in practically all segments of society. In addition, despite of reforms, the judicial system is

still not able to provide effective law enforcement and effective respect for business contracts. Besides that, collection of receivables due is still very problematic and uncertain<sup>6</sup>. Bearing in mind, the current legal and social environment any plan to attract foreign investors cannot give the expected results. For example, labor costs in Bulgaria and Romania are much lower than in the Czech Republic; however, this country is the most attractive destination for most of the serious foreign investors<sup>7</sup>. This is primarily due to a more secure economic environment and significantly lower level of corruption in comparison with Romania and Bulgaria. Hence the creation of effective regulatory and judicial system represents imperative in the future implementation of economic policies, not only for the purpose of attracting foreign direct investors, but also more widely viewed, in order to create positive and safe business environment and more efficient market economy in Serbia.

However, when it comes to direct economic policy measures, in order to attract foreign investors we should be very careful. Specifically, as budget subsidies cannot solve problems of inefficiency of public enterprises, no budget subsidy for foreign investments can solve the fundamental problems that reject investors.

## Conclusions

The economic crisis, which swept the world as a "big bang", leads to a redistribution of power in favor of those countries whose economies continued to record positive growth rate of GDP and which have kept their foreign exchange reserves and balanced state budgets (e.g. China, Russia, South Korea and Japan). Multinational companies, yesterday's biggest investors in developing countries, are trying to sell or lease its daughter companies in developing countries to the new investors and to invest in major markets, whose purchasing power is not that much damaged by the

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<sup>6</sup> Serious investors, to a large extent, this situation discourages and encourages negative economic selection and "hunting in troubled waters".

<sup>7</sup> The average net salary in the Czech Republic is 700 Euros versus 350 Euros in Romania and 250 Euros in Bulgaria.

crisis (Brazil, Russia, India and China) and therefore leaves little room for developing countries. Yet despite this, in the modern international economy, foreign direct investments are the quickest way for developing a country and region, taking the role of key developmental factor of national economy. This is the reason for the need of proper consideration of the SWOT matrix of the investment potential of Serbia. Looking at the factors, that is, the drivers of FDI, the export of capital may occur: due to lower prices of raw materials and energy in countries that attract capital, cheaper labor abroad, desire to round up the manufacturing process to make production less dependent on external factors, expansion of markets for selling products, as well as facilitated access to other markets across the country recipient of FDI, minimizing the costs caused by the payment of customs duties and other import duties, securing political influence in the country and the region as well as the impact on competition, etc. In developing countries, as opposed to "hunger" for foreign direct investments as well as for any form of long-term loans, is alert and diminished foreign capital which, so far, until the markets don't open, is ready to enter into lease of the existing production capacities and hire labor, for a specified period with a lower additional investment. Serbia needs to see her chance in adapting to the situation imposed by the long-term economic crisis and which is changing patterns and regions of investment, as well as the foreign investors.

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## Organizational learning and knowledge creation processes in SMEs

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*Nowadays, the business life for many companies is becoming increasingly complex and novel because of dynamic processes and rapid changes those are occurring in economy. In order to cope with fast changing environment organizations are forced to increase their knowledge base and thus learn continuously. Herein, organizational learning and knowledge creation processes are becoming of crucial importance if the organizations are to succeed. But, are these processes found in all enterprises?*

*Small and medium sized enterprises (SMEs) are playing an important role within Western economies. For instance, in the EU SMEs account for more than 50% of total employment. Hence, we investigated the organizational learning and knowledge creation processes in SMEs, as the textbooks mainly refer to larger enterprises.*

*I concluded that both processes were not found to a full extent as described in theory. The processes not only vary from one another, but they also vary from one enterprise to another. The empirical data clearly indicates that these findings are due to the lack of resources, knowledge and size.*

*The organizational learning process focuses more on explicit knowledge, as it is rooted in Western epistemology and therefore can be found to a comparably higher extent in the investigated enterprises than the knowledge creation process, which focuses more on the interaction between tacit and explicit knowledge, as it is rooted in the Eastern epistemology.*

**Keywords:** creation processes, organizational learning, SMEs

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## Introduction

When one reads today's economic news one can easily find reports about companies that lay off employees. Just think of ABB, Ericsson, and Fiat to name a few. All these companies are big players with several billion Euro turnover and tens of thousands employees. These companies are no longer producing jobs due to globalization and rationalization of processes. Without any doubt, the global economic situation shows signs of recession. Yet, there are also small and medium-sized enterprises (SMEs) that offer new employment opportunities. SMEs play a dominant role for employment and its development<sup>1</sup>. This is something that many western politicians have realized as well. Therefore, they put it on their agenda and they see SMEs as a solution to solve the serious problem of growing unemployment. For instance, Sweden established already in 1979 the Swedish Industrial Development Fund to encourage profitable growth and innovation in the sector of SMEs<sup>2</sup>.

In 2001, approximately 10 % of the Swedish labor force was self-employed and there existed about 500000 SMEs, which accounted for 59 % of total turnover and 57 % of the total value-added in the Swedish economy<sup>3</sup>. SMEs employ 60 % of the private sector workforce<sup>4</sup>. According to the joint employment, report 1999 of the EU the contribution of SMEs to employment in the EU varies from 56 % in Denmark, Finland and the UK up to 86 % in Greece<sup>5</sup>. Regarding Europe SMEs account for jobs for 69 million people<sup>6</sup>. Considering the period from 1988 to 1997 for the EU, the report indicates that employment was much more susceptible to economic fluctuations in large enterprises than in SMEs.

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<sup>1</sup> Landström/Frank/Veciana(Eds.), 1998, p. 3; Descy/Tessaring, 2001, p. 165

<sup>2</sup> Lois Stevenson, Anders Lundström, "Patterns and trends in entrepreneurship/SME policy and practice in ten economies", Stockholm 2001

<sup>3</sup> Ibid, p.318

<sup>4</sup> Ibid

<sup>5</sup>Joint Employment Report (1999)

<http://europa.eu.int/scadplus/printversion/en/cha/c10229e.htm> 31<sup>st</sup> May 2003, see appendix 3

<sup>6</sup> Landström/Frank/Veciana (Eds.) 1998, p. 3

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On the other hand, it is said that organizational learning and knowledge creation is the key to face future challenges as we have entered the so-called knowledge era. There are many theories that deal how to initiate organizational learning and knowledge creation<sup>7</sup>.

However, if one takes these theories into consideration they often require big efforts to be applied or implemented. These efforts result in the need for resources like human or financial, which in our point of view SMEs sometimes lack. The theories do not claim explicitly to deal only with large enterprises, however it is difficult to imagine whether SMEs really use these theories because of their limited resources and because they might not have the knowledge of the respective theories. Yet, if these SMEs want to compete, they have to face these challenges of the knowledge era as well.

## **Problem discussion**

As we, already discussed SMEs are very important for economic growth and development. Today Swedish policy focuses increasingly on the relationship between SMEs, which is based on the evidence that networks initiate and promote growth<sup>8</sup>. According to our knowledge, many authors have written about SMEs with main concern of the network. There is not much written about knowledge creation and organizational learning that occur in SMEs<sup>9</sup>. However, SMEs as opposed to larger enterprises are in a position of weakness and vulnerability to fail, particularly in the beginning of their development because the administrative environment is more and more complex, regarding legal and fiscal aspects. Besides this, SMEs face numerous difficulties, such as the lack of suitable training programmes to develop managerial capabilities, financial difficulties, difficulties in

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<sup>7</sup> Schein, Senge, Nonaka

<sup>8</sup> Stevenson and Lundström, p.319

<sup>9</sup> From 1974 to 1995, 35 theses in Sweden have been conducted in the field of entrepreneurship and small businesses none of them dealt with organisational learning or knowledge creation. (Johannisson, Landström, pp. 281-283 in: Landström/Frank/Veciana (Eds.), 1997, pp. 276-295

influencing R&D programmes and difficulties to entry markets<sup>10</sup>. This indicates that SMEs have to deal with complexity on a large scale.

Considering the complexity and rapid changes that occur in the environment, SMEs need to focus on knowledge creation and learning processes in order to survive. We think that SMEs in general learn and create knowledge differently than large enterprises because they lack financial and human resources that large enterprises use to create knowledge and to learn. We assume that knowledge is the outcome of organizational learning. According to Nonaka and Takeuchi:

*“Creating new knowledge is also not simply a matter of learning from others or acquiring knowledge from the outside. Knowledge has to be built on its own, frequently requiring intensive and laborious interaction among members of the organization.”*

This statement indicates that there is a close relation between knowledge and learning. As the people interact with each other, they will learn and therefore new knowledge is created. In order to create knowledge the process of learning that takes place when members of organizations share their skills must be reformed, enriched and translated to be related to the enterprise’s identity<sup>12</sup>. Taking the previous words into account it becomes clear that the individual members of organizations are the ones who learn and thereby create knowledge by sharing their skills. If individuals within the organization share their ideas, experiences, information and knowledge through discussions and mutual interactions then learning can take place<sup>13</sup>.

Nevertheless, one can argue that there is something that is not only the result of individual skills, take for example the orchestra that performs Beethoven’s symphonies. Even the most skilled professional violinist cannot perform a symphony on her own. Furthermore, it requires the collective performance of the bassist, the cellist, the trumpet player and all the other members of the orchestra as a group to enact the symphony. Hence,

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<sup>10</sup> Karin de Lind van Wijngaarden and Rob van der Horst, 1998 in: Landström, Frank, Veciana, 1998 p. 380

<sup>11</sup> Nonaka & Takeuchi, 1995, p.10

<sup>12</sup> Ibid, p. 11

<sup>13</sup> Probst & Büchel, p.9

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according to Cook and Yanow: “*Organizational learning, then, describes a category of activity that can only be done by a group. It cannot be done by an individual.*”<sup>14</sup>

However, these processes ensure organizations to keep their pace of developing and thus lead to sustainable long-term goal attainment. As knowledge is sometimes the only resource that is available the organizations needs to handle it with care and use it smartly. This knowledge can take shape in many ways. For instance, it is knowledge about customers or about production processes. It can be the result of formal education or intuition. If this knowledge can be embedded in the organization and become part of the social entity the organization and its members can use and benefit from it.

Only sustainable learning and knowledge creation will help to secure the long-term success of any enterprise. Therefore, SMEs need to make the knowledge available to the organization in order to use it. Organizational learning is then the process, which leads to organizational knowledge<sup>15</sup>. Yet, organizational knowledge is also the result of the knowledge creation process<sup>16</sup>. Accordingly, both processes may not be the same, but their result is comparable, as it is organizational knowledge. Hence, our interest is to find out to what extent the organizational learning and knowledge creation processes can be found in SMEs as described in theory.

## **Problem formulation**

Taking into consideration our problem discussion, we come to the following research question:

**Are the organizational learning and knowledge creation processes as described in theory also found in SMEs? If yes, to what extent and why?**

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<sup>14</sup> Cook & Yanow, p. 403, in: Shafritz & Ott, 2001, pp. 400-413

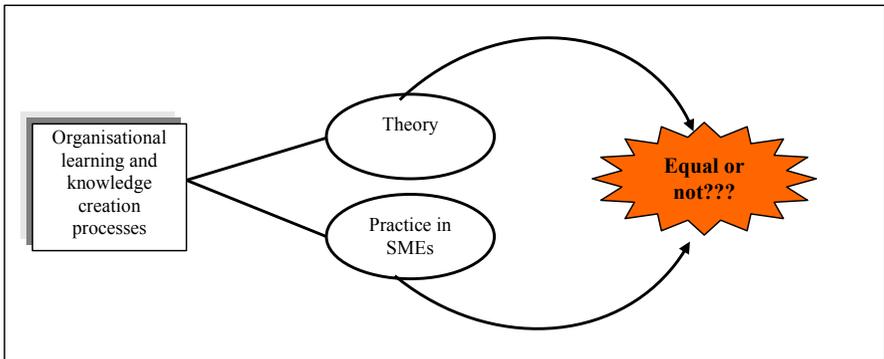
<sup>15</sup> Argyris & Schön, 1996, p. 15 f.

<sup>16</sup> Nonaka & Takeuchi, 1995, p. 56

## Purpose

The purpose of this paper is to explain to what extent organizational learning and knowledge creation processes are found in SMEs as described in theory, and why these processes are found to that extent.

In the following figure, we illustrate the relationship of our phenomenon. We are going to test the theoretical processes of organizational learning and knowledge creation in SMEs. Therefore, we will compare our analytical model with empirical findings in practice. When the organizational learning and knowledge creation processes are found in SMEs, they will also increase their long-term sustainability and profitability.



**Figure 1:** Our study phenomenon

## Claims/Hypotheses

H1: Organizational learning and knowledge creation processes are found to a full extent in SMEs.

H2: Organizational learning and knowledge creation processes are not found to a full extent in SMEs.

H3: Reasons that organizational learning and knowledge creation processes are not found to a full extent are due to a lack of resources, knowledge and size.

H4: Organizational learning and knowledge creation processes are not found at all in SMEs.

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## Scientific Research

Concerning our research, we apply the positivistic approach, because we see the world as descriptive, and phenomena can be explained and proved by observation. In order to investigate an event successfully in a positivistic way it is necessary for the researcher to go close and look at the world objectively. Considering the fact that the positivistic viewpoints are idealistic positions, it is very difficult to follow one strictly. However, we tried to stay as objective as possible. Except positivistic approach our research with hypothetical deductive view, which implies starting with the existing theory and then building an own model that afterwards based on the empirical research the theory model will be tested. Therefore, we tested the theoretical model, which represent the organizational learning and knowledge creation processes as described in theory. Also Since we are dealing with organizational learning and knowledge creation processes we used the qualitative research method of a case study. We argue that organizational knowledge is something relative and difficult to measure. What is knowledge for someone might be just information or data for someone else. Furthermore, our phenomena have a dynamic character, as they are processes and changes over time. Therefore, our research is based on qualitative research for it is easier to identify knowledge in personal interviews instead of quantitative surveys. Using interviews gave us access to gather qualitative information needed for our thesis. Furthermore, quantitative methods bear the risk of misunderstanding because questionnaires in English could be unclear to the respondents and clarification could not have been provided as opposed to the interview.

## Theoretical data collection

We collected theoretical data from different sources. We chose carefully the literature relevant to our project. We searched for literature about knowledge creation and organizational learning at the library in Växjö and used literature from previous courses. We also searched for SMEs' literature and tried to find related literature to organizational learning and knowledge creation. For data collection we used keywords, like, "knowledge

creation”, “organizational knowledge”, “SMEs”, “Entrepreneurship”, “learning organizations”, “organizational learning”, etc.

## **Empirical data collection**

We randomly picked 3 SMEs that operate in the manufacturing industry but are of different size. These enterprises are Gnosjö Automatsvarvning AB, Växjöfabriken AB and Plast AB Orion. Of course, we could have chosen to investigate another industry. The reason why we focus on one industry is to exclude external influencing factors that might affect our study. We selected three SMEs because we do not want to compare just two enterprises. A third enterprise gives us opportunity to support our findings. In order to verify our findings a broader empirical basis would be better. But also due to the time constraints we limited our research to three companies.

## **Analytical model**

The purpose of this paper is to test to what extent the theoretical organizational learning and knowledge creation processes are found in SMEs and why it is so. The analytical models presented in the following lines will be tested by indicators, which have a qualitative parameter value (yes/no). We provide tables that indicate the extent of application of organizational learning and knowledge creation processes. We are aware that it is possible that our empirical findings do not match the suggested analytical model. On the one hand the findings may not fit with the suggested extents (maximum, high, medium, and low). On the other hand, the findings could vary from one to another investigated enterprise, which will limit our possibility to generalize our conclusion.

In order to gain more insights in the situation of SMEs, we will also investigate the actual amount of resources related to the two processes, the knowledge regarding both processes, and their size with regards to number of employees, turnover, and balance sheet total.

## The organizational learning process

The following table summarizes our theoretical findings of the organizational learning process in chapter 3.2. The categories in the left column of the table present “agents of learning”, which are a prerequisite to organizational learning. These agents have to overcome the “barriers to learning” in order to enhance “learning on the job” and “learning off the job”. Afterwards we present in table 3 how the extent of organizational learning is indicated.

**Table 1:** The organisational learning process

The organizational learning process	Indicators
Agents of learning	Individuals
	Elites
	Groups/communities of practice
	Systems
Barriers to learning	Skilled incompetence
	Defensive routines
	Fancy footwork and malaise
	Norms, privileges, taboos
Learning on the job	Instruction, coaching
	Quality circles
	Decentralized learning/learning islands
	Interactive learning
	Teamwork
	Rotation
	Project work
	Vocational adjustments
	Continuous improvement processes
Learning off the job	Courses, Seminars
	Meetings/Events/Workshops
	Skills training centre/ teaching
	Institutions of higher education
	Benchmarking

We consider the “agents of learning” as the variable who can overcome the barriers to learning and establish organizational learning on and off the job. Our idea is to look for each variable by investigating the indicators in each researched enterprise. We assume the number of indicators vary in each enterprise.

Agents of learning – The agents should according to theory trigger organizational learning. We identified four groups of agents of learning, which indicate whether the learning is enhanced in SMEs or not.

Barriers to learning – According to theory there are five barriers to learning. We investigated these barriers in our research enterprises. We assumed that same barriers could not be found. If one looks at information disorders it might be not a problem in SMEs due to their size.

Learning on the job – It is much more likely that we can identify some of the nine indicators to learning on the job in SMEs as some of them are the traditional way of learning.

Learning off the job – The five indicators for learning off the job are typically found in enterprises. However, due to the lack of resources of SMEs we doubt that all of these indicators can be found in SMEs.

The following table illustrates the extent of organizational learning process in the investigated enterprises. The extent to which the organizational learning process is found is based on the amount of indicators found regarding each variable.

**Table 2: Extent of organisational learning process**

Variables	Extent of the organisational learning process found in the enterprises (indicators)			
	Maximum	High	Medium	Low
Agents of Learning	All	Individuals + 2	Individuals + 1	Individuals
Barriers to learning	0	0-1	2-3	4-5
Learning on the job	9	7-9	3-6	1-2
Learning off the job	5	4-5	2-3	1-2

All the above-illustrated variables will be counted by the amount of indicators, except for agents of learning because the agents of learning are the ones who can overcome the barriers to learning and establish learning on and off the job within the enterprise. In an enterprise that applies the maximum extent of the organizational learning process all the agents of learning can be found, as well as there are no barriers to learning. In this ideal situation, all the indicators of learning on and off the job can be identified, too. An enterprise where the organizational learning process is found to a high extent there can be found individuals and two more agents of learning. Furthermore, there should not be more than one barrier to learning and finally there will be seven to nine indicators for learning on the job and four to five indicators for learning off the job. If in an enterprise can be identified only individuals and groups/communities of practice and there are two to three barriers to learning. And if there are just three to six indicators for learning on the job and two to three indicators for learning off the job, then the organizational learning process is found to a medium extent. Finally, if there exist no agents of learning besides individuals and there are four or five barriers to learning there will be not more than one or two for each learning on and off the job, then the organizational learning process is found to a low extent.

## The knowledge creation process

In table 3 we summaries our theoretical findings regarding the knowledge creation process. The process consists of the knowledge assets derived from the SECI-process and enabling conditions, which promote the knowledge creation process. For each category, there are indicators that show the extent to which the knowledge creation process is found.

**Table 3:** The knowledge creation process

<i>The knowledge creation process</i>	<i>Indicators</i>
<b>Ba</b>	Originating Ba
	Dialoguing Ba
	Systemizing Ba
	Exercising Ba
	Autonomy

<b>Enabling conditions</b>	Fluctuation and creative chaos
	Redundancy
	Requisite variety
	Love, care, trust and commitment
<b>Experiential knowledge assets (socialization)</b>	Skills and know-how of individuals
	Care, love, trust and security
	Energy, passion, tension
<b>Conceptual knowledge assets (externalization)</b>	Product concepts
	Design
	Brand equity
<b>Systemic knowledge assets (combination)</b>	Documents, specifications, manuals
	Database
	Patents, licenses
<b>Routine knowledge assets (internalization)</b>	Know-how in daily operations
	Organizational routines
	Organizational culture

Subsequently we present the variables that are included in our model:

Ba – There are four types of Ba that facilitate the organizational knowledge creation process. Ba is the time and space where interactions take place. The four types of Ba represent the place where the knowledge spiral is generated. Without Ba the process of knowledge creation cannot be found in SMEs. Therefore, we sought for the four types of Ba in SMEs.

Enabling conditions – In our theoretical chapter we identified five enabling conditions of knowledge creation. These conditions promote the knowledge creation spiral. We assume that these can be found in SMEs; however, the question is whether they promote a knowledge creation spiral.

Experiential knowledge assets – This variable means sharing of tacit knowledge among employees, which is a prerequisite of knowledge creation. Furthermore, it indicates constant and mutual interaction and dialogue. Due to the fact that SMEs have a small number of employees we assume that sharing of tacit knowledge among employees is faster compared to larger

companies. Nevertheless, we will see in how far this sharing takes place and initiates the knowledge creation spiral.

**Conceptual knowledge assets** – This variable means transforming tacit to explicit knowledge, which is articulated by symbols, images and languages. These are based on concepts held by customers and members of the organization. Hence, we looked for the concepts held by the members of the SMEs and how they take into consideration, the concepts held by their customers.

**Systemic knowledge assets** – These indicators are rather easy to identify. This variable offers a context for the combination of existing explicit knowledge because explicit knowledge can relatively easy transmitted to a large number of people in written form. Therefore, the question will be whether such explicit knowledge exists in the SMEs and whether it is shared or not.

**Routine knowledge assets** – Here, the employees embody explicit knowledge that is communicated in written form. All of it leads to enhance tacit knowledge from explicit to tacit knowledge. These knowledge assets are easy to find because they are very practical. However, it is important to compare all the identified knowledge assets whether they comprise a knowledge creation spiral or not.

In the following table 4 the extent to which the knowledge creation process is found will be classified.

**Table 4:** Extent of the knowledge creation process

Variables	Extent of the knowledge creation process found in enterprises (indicators)			
	Maximum	High	Medium	Low
Ba	4	3-4	2	1
Enabling conditions	5	4-5	2-3	1

Experiential knowledge assets	3	3	2	0-1
Conceptual knowledge assets	3	3	2	0-1
Systemic knowledge assets	3	3	2	0-1
Routine knowledge assets	3	3	2	0-1

All the above-illustrated variables are counted by the amount of indicators. In an enterprise that applies the maximum extent of the knowledge creation process all the types of Ba, knowledge assets and enabling conditions can be found. An enterprise where the knowledge creation process is found to a high extent there can be found three to four types of Ba, three knowledge assets in each category and four to five enabling conditions. If in an enterprise can be identified only two types of Ba, two knowledge assets in each category and two to three enabling conditions, then the knowledge creation process is found to a medium extent. Finally, if there exist only one type of Ba, no or one knowledge asset and at least one enabling condition then the knowledge creation process is found to a low extent. However, it is possible that in an enterprise can be found one indicator for knowledge assets for socialization and externalization but no combination and internalization can take place. Furthermore, it is necessary to find at least one type of Ba and one enabling condition so the knowledge creation process can take place.

## Comparative analysis - Organizational learning

When comparing all the results regarding the organizational learning process there some similarities that could form a pattern. First, individuals and systems are found in all three enterprises as agents of learning. All the enterprises consider the individuals as key player concerning learning. Also they see the necessity to store the available knowledge of the individuals in order to make it accessible to the enterprise. Those agents contribute to overcoming the barriers to learning. However, the enterprises are not aware of the crucial role that elites and

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groups/communities of practice could play in order to increase the learning process and thus competitiveness.

Concerning the barriers to learning it is striking that skilled incompetence, fancy footwork and malaise, as well as norms, privileges and taboos could not be identified in one of the enterprises. This can be explained by the enterprises' size. Two enterprises are small sized and one was medium sized enterprise according to our definitions, therefore the employees work close to each other and the management is very open to the employees. They trust each other, and mistakes are seen as a way to learn rather than as failure. Moreover, public rejection does not occur because there is no public. Due to the size, every single employee has a significantly higher influence on the enterprises' public. However, the relationship among the employees in all the investigated enterprises was described as good.

Learning on the job is proceeding in all the enterprises. Especially instructions, coaching, and vocational adjustments are used in all enterprises because all of them are directly related to the actual work process. Teamwork and rotation appeared also in all investigated enterprises due to their size. The employees need to rotate in order to perform different operations, so they can perform tasks and substitute one another. This can also be related to the limited number of employees who represent the human resources. Due to their lack of resources and the size continuous improvement processes are necessary in order to secure high quality performance and thus competitiveness.

With respect to learning off the job all, the enterprises offer meetings, events, and workshops off the job. Often these "events" include the whole enterprise because they unite and strengthen their relationships. This is regarded as very important because disturbances or negative tensions could jeopardize the existence of the enterprise. Visiting institutions of higher education is supported in all enterprises. The limited resources of the enterprises can explain this. If employees visit institutions of higher education, they do it in their spare time. By doing that they increase their skills and knowledge base. Therefore, by supporting the employees to visit these institutions the enterprises also benefit from it. Thereby, the learning is transferred from a job oriented in company activity to a broader context where each individual takes responsibility to learn. This can be described as

outsourcing of learning because the employees invest their own resources (leisure time). As benchmarking is found in all enterprises, the size and the lack of resources can also explain it. First, due to their size the enterprises can benchmark only externally. They do it in order to stay competitive. Second, they do not have the resources to develop best practices on their own, as none of the enterprises has an R&D-department. Furthermore, skills training centre's, teaching workshops and learning offices could not be identified in the three investigated enterprises. This is due to their size and lack of resources. First, the number of employees is not enough to provide these tools permanently. There is simply not enough demand for them. Secondly, these tools require sufficient human and financial resources for maintenance. They are not capable to implement and maintain these tools.

### **Comparative analysis – Knowledge creation process**

Based on our findings regarding the knowledge creation process in three enterprises one can say that this process is different on each enterprise. Starting with Ba as a context that facilitates the knowledge creation process, it is taking place from zero to a high extent. Size, knowledge and resources can explain this circumstance.

With respect to the enabling conditions, they do not only occur to a medium extent but in fact they are also the same in all investigated enterprises. Indeed, the different extents cannot be explained by the enabling conditions. Moreover, the size, knowledge or resources do not seem to have an influence on the enabling conditions when comparing the three enterprises. Therefore, these results could form a pattern that is typical for SMEs. However, the three enterprises are small and its employees work close to each other; among them are embodied care, love, trust and commitment. The presence of requisite variety is due to the rotation of employees. Hence, redundancy cannot be found so the information flow must be sufficient. All the three enterprises are working as a sub-supplier based on customers' orders for that they have not faced crisis, yet. Another indicator found in three investigated enterprises, is autonomy. The relatively small size is something that all the enterprises have in common. They do not have huge human resources to supervise all the work done. Therefore, love,

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care, trust and commitment determine the relationships so the employees perform their tasks autonomously because the machines need to run.

## Conclusions

Based on our problem formulation we assumed that the organizational learning and knowledge creation processes are not found to a full extent in SMEs as described in theory. First, we explicated the special role of SMEs in the modern economy and its consequences regarding the two processes. Hereby, we reasoned that the processes are not found to a full extent as described in theory because of the lack of resources, knowledge and size. Second, we elaborated the theories that are dealing with the two processes. Thereby, we pointed out the similarities and differences between these processes. From these theories, we derived our analytical model, which was the basis of our empirical data collection.

With respect to our assumption, the empirical findings do not falsify our initial claims. Moreover, we can approve that organizational learning and knowledge creation processes are not found to a full extent in the investigated enterprises. Furthermore, we elucidated that the extent to which the processes are found, vary between the enterprises as well as between the processes. This variation can on the one hand be explained by the lack of resources, knowledge and size. On the other hand, the extent of the knowledge creation process was in all investigated enterprises comparably lower as the extent of the organizational learning process. This supported the epistemological influence as all the investigated enterprises are embodied in Western epistemology.

The empirical findings point out also some similarities that could form a pattern for SMEs. Regarding the organizational learning process individuals and systems could be found in all investigated enterprises. This is endorsed by the fact that learning is considered as important by all the interviewees. Therefore, every enterprise has learning on their agenda and the agents of learning are present to a high extent in all investigated enterprises. However, does not every enterprise manage to overcome the barriers to learning, although they have the same number of agents of learning?

With respect to learning on the job, six out of nine indicators were identified in all enterprises. These indicators are related to the actual work process where employees are instructed or coached, work in teams, rotate and are adjusted vocationally. Learning is part of the work process and therefore decentralized in order to improve processes continuously. Hence, working in these enterprises is signified by closeness. The reason is obvious because the enterprises are small and by sharing their knowledge and experience e.g. through rotation and teamwork the employees are on all-purpose. Thereby, the lack of resources, financial as well as human, can be overcome by the enterprise because the machines can run with a comparably lower amount of employees. Besides learning on the job, learning off the job is also taking place in the investigated enterprises. We identified three out five indicators in all enterprises. Meeting, events, workshops, institutions of higher education and benchmarking were used or supported in the enterprises. In comparison skills training centre, teaching workshops and learning offices were not identified at all. Courses and seminars were found only in two enterprises. The expenses and benefits that are connected with these indicators can explain these findings. As well there is missing the human capacity to attend these tools. Meetings, events and workshops are considered as a useful tool to train the employees or motivate them. These tools were appropriate for the enterprise because they did not require extraordinary amounts of financial and human resources. Supporting the employees to visit institutions of higher education offers the enterprises the opportunity to increase their employees' skills and the organizational knowledge base. The enterprises appreciated the institutions because they were mainly taking place outside the working hours, so it can be considered as an outsourcing of learning on behalf of the employees. We pointed out that benchmarking is used in all investigated enterprises because it offers them to improve (learn) without extraordinary expenses and commitment of the employees.

Eventually, learning on the job is taking place to a higher extent than learning off the job in the investigated enterprises. Learning on the job is regarded as more appropriate for SMEs because it requires less financial and human resources to be involved in this process than learning off the job. Moreover, the outcome of learning on the job is much more visible than

learning off the job because the learning affects directly the productivity whereas learning off the job has a more indirect effect on the productivity.

Taking into account the knowledge creation process, we can conclude that there are more differences than similarities. For Ba we could not identify a common pattern due to the lack of knowledge about these concepts in two enterprises. However, the enabling conditions were found in all enterprises to the same extent. Therefore, we conclude that this illustrates a pattern for SMEs. In all the enterprises, the employees were facilitated to be autonomous as far as circumstances permit. We relate this to the size of the enterprises. There was no strict hierarchy; instead, the structure was rather flat. Thus, the employees should contribute to the production process otherwise; they will increase the enterprises' lack of resources. Requisite variety is important to cope with new challenges. Therefore, in every enterprise the employees rotate in order to improve their skills. Consequently, the enterprises have skilled employees who can perform different tasks and thereby reduce the need for human capital because the same number of employees can perform more tasks and support each other. Due to the size, the relationships among the employees influence the success of the enterprise. Therefore, good relationships based on love, care, trust, and commitment will not only improve the climate in the enterprise but also the success positively. In SMEs, it is nearly impossible to stay anonymous. Hence, close relationships enhance those feelings among the employees. Consequently, the employees are energized, passionate and develop positive tensions to accomplish their tasks. Hereby the socialization process as initial mode for knowledge creation is fostered in all the enterprises. Nevertheless, tacit knowledge is not converted to explicit knowledge in a desirable level. According to our empirical findings, the investigated enterprises are dealing mainly with explicit knowledge. All of them are working nearly exclusively as sub-suppliers and do not investigate in research and development of new products. Therefore, the explicit knowledge is stored in their databases where it is accessible to all employees but is not combined in order to develop patents or licenses. Unfortunately, the explicit knowledge is not used completely as a basis to creating new tacit knowledge. Although, all enterprises have their unique organizational culture; internalization of explicit knowledge to continue the knowledge creation spiral is not taking place continuously.

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## Reflection upon our paper

We believe that we fulfilled our purpose and answered our research question. We concluded that the two processes differ because they belong to diverse epistemologies. Moreover, they also differ between the investigated enterprises. We have shown that the three investigated enterprises were dealing mainly with explicit knowledge, which signifies the Western epistemology. Thus, using and working with tacit knowledge can be improved in all investigated enterprises. Hence, it could have been useful to investigate also SMEs from the Eastern epistemology. However, it is difficult to find these enterprises in Europe because there are no SMEs from the Eastern epistemology.

Finally, we concluded our research although there are still many interesting aspects that could be researched further. Our research was focused on three SMEs in the manufacturing industry. Therefore, it would be promising to conduct our research in other industries, for example the service industry. Furthermore, we pointed out that the differences between the organizational learning and knowledge creation process seems to be rooted in the different epistemological origins of the theories.

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## Potential Impacts of Global Climate Change on Power and Energy Generation

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Climate change and climate variability is receiving much attention recently because it has significant effects on our power and energy sector and therefore on the socio-economic activities of the society especially in a developing country such as Nigeria. Approach: The aim of the study is to examine the influence of climate change on power generation. Literatures were identified for review through a comprehensive search by using electronic and non-electronic databases. Related published literature and documents were searched in a systematic way using a range of key words relating to climate change impacts and energy. Results: The literature review indicates that climate change undermine power and energy production by increasingly depleting renewable and non-renewable sources, creating resources scarcity as well as damage to infrastructure. The review also indicate that climate change undermine environmental dimensions by increasing sea-level rise, extreme weather events and land degradation and pollution. Conclusion: In reducing climate-induced threats on power sector, efforts should be geared towards ensuring that our energy sector withstand the changes to our climate that are already underway by optimizing energy mix, developing low carbon and renewable energy, formulating relevant law and regulations and promoting technology advancement and economic engineering.

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**Keywords:** *Climatic change, alternative energy, mitigating policy, renewable energy, coal-bed methane, united nations framework, power generation, mitigating policies, global climate models, Nigeria energy scene, Global warming*

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## Introduction

Climate change is a major global issue of common concern to the International Community. It is an issue involving both environment and development, but it is ultimately an issue of development. Climate change will have wide-ranging impacts on society and the infrastructure that supports civilization. Global warming could impact not only on agriculture and human health but also patterns of human settlement, energy use, transportation, industry, environmental quality and other aspects of infrastructure that affect our quality of life (IPCC, 1990).

Numerous examples from history illustrate how the success of civilization and human welfare is intimately linked to climate (Gore, 1993). Fossil-fuel use will affect future climate. Fossil fuels, currently the mainstay of economically developed countries, supply energy either directly as fuel or indirectly as generated electricity, for manufacturing, agriculture, transportation and space heating. Future Green House Gas (GHG) emissions and resultant climate change will depend largely on future rates of fossil-fuel consumption.

Many complex and interacting factors determine the consumption rate of fossil fuels. Demand is a result of population growth rate, availability of fossil fuel, energy efficiency, conservation measures and use of non-fossil energy sources, general industrial productivity, energy policy and future climate (Hardy, 2003). All these factors will affect fossil-fuel utilization rates and future climate.

This study examines how climate change influences power and energy generation in general, with emphasis on the Nigeria Case. Specifically, it will examine the concept, causes and effects of climate change; world energy scene, Nigeria energy scene, effects of energy use on

climate, key areas for GHG, mitigation, alternative energy sources and Nigeria's efforts in mitigating climate change.

**Climate change: An overview:** Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity. The United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as a change of climate which is attributable directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over a comparable time periods (IPCC, 2001). The Earth's climate is driven by a continuous flow of energy from the sun. Heat energy from the sun passes through the earth's atmosphere and warms the earth's surface. As the temperature increases, the earth's sends heat energy (infrared radiation) back into the atmosphere. Some of this heat is absorbed by gases in the atmosphere, such as carbon dioxide (CO<sub>2</sub>) (the major contributor to global warming), water vapor, methane, nitrous oxide, ozone and halo carbons.

These gases, which are all naturally occurring, act as a blanket, trapping in the heat and preventing it from being reflected too far from the earth. They keep the earth's average temperature at about 15°C warm enough to sustain life for humans, plants and animals. Without these gases, the average temperature would be about -18°C... too cold for most life forms. This natural warming effect is also sometimes called the greenhouse effect.

These rapid increases in the condition of these gases in the atmosphere due mainly to human activity, particularly the burning of fossil fuel and deforestation, have been affecting the surface climate of the earth. This alteration is achieved through altering the radiation balance of the earth, warming the surface and affecting atmospheric circulation. It is this global warming of climate, the enhanced greenhouse effect that has become the subject of concern at global, national and local level (Carter et al., 1994).

**Climate change: Causes and features:** The major causes of climate change are both anthropogenic and natural. The IPCC, fourth report released in 2007 stated that, multiple lines of evidence confirms that the post-industrial rise in greenhouse gases does not stem from natural mechanisms. In other words, this is anthropogenic climate change and the significant increases in

the atmosphere of these potent greenhouse gases are as a result of human activity (IPCC, 2007). The most potent of the greenhouse gases are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O).

The natural causes are increases in the volume of gases, moisture and particulates in the lower atmosphere by volcanic eruptions, ocean turbulence, and desert winds. These forces combine with anthropogenic forces to create greenhouse conditions. A serious natural factor is the alteration in the intensity of solar radiation itself in the form of sunspots—representing the most well known expression of solar activity (Lozan, Hupfer and Global, 2000). Lozan et al. (2000) identified 27 greenhouse (CFC) gases in the atmosphere. A principal component of these gases is CO<sub>2</sub>, which contributes approximately 49% of the 3.3°C increase in warming due to these gases. This CO<sub>2</sub> dominance is due to industrialization in America and Europe and Biomass burning and gas flaring in the tropics (FAO, 1997). So far, Global Climate Models (GCMs) have projected three generalized impact of climate change arising from global warming which are of immediate relevance to Africa in general and Nigeria in particular (IPCC, 1999). These are summarized as follows:

- Desserts are likely to become extreme - becoming hotter but not significantly wetter. The Sahara desert which borders West Africa to the north has been noted to be making almost persistent “incurSION” into the Sahel resulting in drier conditions during the summer monsoon.
- Global hydrology cycle will be intensified with changes in precipitation, its total amount, frequency and intensity. And this will certainly affect hydropower generation.
- Agricultural production (including forestry) will increase in some areas and decrease in others taking into account the beneficial effects of CO<sub>2</sub> concentration.

World energy consumption and electricity generation: Coal has led the recent surge in global energy demand and is on a strong growth path. Statistics from the world coal institute show that coal provides 25% of global primary energy needs and generates 40% of the world’s electricity and production of coal has grown 78% over the last 25 years.

It is a truism that presently we are at a peak oil crisis and there is no doubt that oil stocks and reserves are dwindling. For each year in future, there will be less oil available than there had been in the past. To some extent, this forecast will force us to reconsider cleaner alternatives. If we are going to combat greenhouse gases and global warming, then we must consider alternative energy as a viable choice to traditional fossil fuel sources.

**Nigeria's energy scene:** The National energy is at present almost entirely dependent on fossil fuels and firewood (conventional energy sources) which are depleting fast. According to Chendo (2001), recent estimates indicated that the reserve for crude oil stood at about 23 billion barrels in 1998, natural gas 4293 billion m<sup>3</sup> at the beginning of 1999, made up of 53% associated gas and 47% non associated gas. Coal and lignite stood at 2.7 billion tones, Tar sands at 31 billion barrels of oil equivalent and large-scale hydropower at 10,000 mv. Tables 1 and 2 show various conventional and non-conventional energy sources and their estimated reserves in Nigeria.

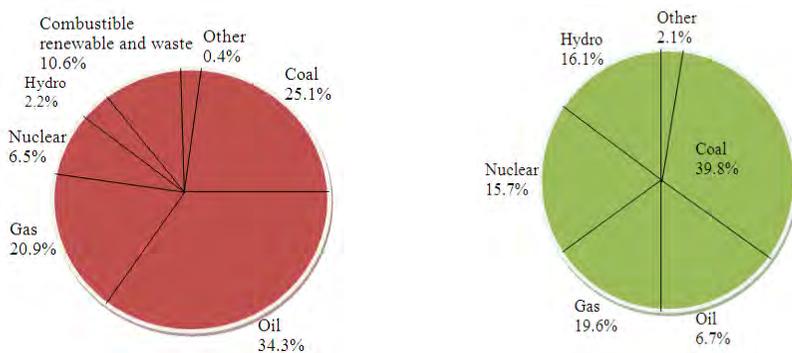
**Energy supply mix in Nigeria:** The 1995 distribution of energy consumption (Fig. 2) typifies the current energy supply mix in the country. It shows that of the total energy consumption, the share of natural gas was 5.22%, hydroelectricity 3.05%, fuel wood had the lion share of 50.45% and petroleum products had 41.28% share. This further confirms the fact that presently, renewable-energy use in the country is split essentially between hydroelectricity and traditional fuel wood (Akinbami, 2001).

**Table 1:** Nigeria's conventional energy resources *Source: Chendo (2001)*

Resources	Reserve	Resources in energy units (billion tones)	% Total conventional energy
Crude oil	23 billion barrels	3.128	21.0
Natural gas	4293 billion m <sup>3</sup>	3.679	24.8
Coal and lignite	2.7 billion tones	1.882	12.7
Tar sands	31 billion barrels of oil equivalent	4.216	28.4
Hydropower	10,000 mw	1.954 (100 yrs)	13.1
Total	Conventional/ Commercial energy resources	14.859	100%

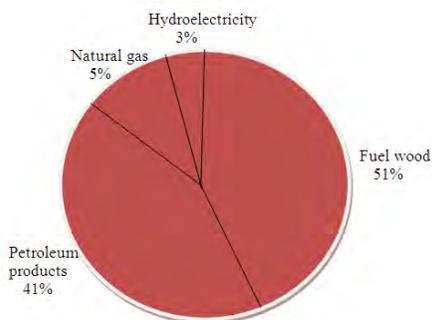
**Table 2: Nigeria’s non conventional energy resources** *Source: Chendo (2001)*

Resource	Reserves	Reserves (billion tones)
Fuel wood	43.3 million tones	1.6645 (over 100 years)
Animal wastes and crop residue	144 million	3.024 (over 100 years)
Small scale hydropower	734.2 mw	0.143 (over 100 years)
Solar radiation	1.0 kw m <sup>2</sup> land area (peak)	-
Wind	2.0 - 4.0 m s <sup>2</sup>	-



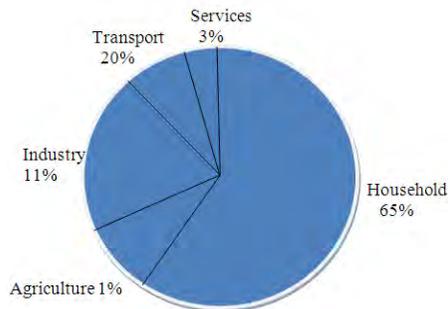
**Figure 1: World Energy Consumption and Electricity Generation. (a): World Energy Consumption. (b): World Electricity Generation**

*Source: <http://www.global-greenhouse-warming.com>*

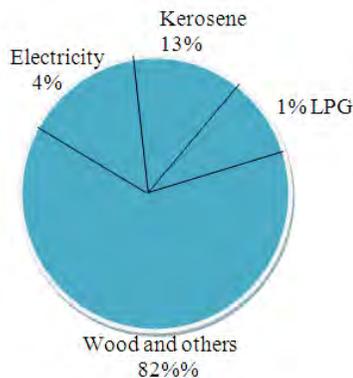


**Figure 2: Typical energy supply mix in Nigeria**

*Source: Akinbami, (2001)*



**Figure 3:** Sectoral distribution of national final energy consumption (PJ) in 1989  
*Source: Oladosu and Adegbulugbe (1994)*



**Figure 4:** Distribution of household final energy consumption  
*Source: Oladosu and Adegulugbe (1994).*

**Economic sectors and energy patterns:** From the energy point of view, the Nigeria economy can be disaggregated into industry, transport, commercial, household and agricultural sectors. However, the household sector presently dominated energy consumption in Nigeria. This makes it the most important energy sector of the Nigeria economy (Oladosu and Adegbulugbe, 1994). Figure 3 shows sectoral distribution of National Final Energy Consumption.

The household sector has consistently accounted for over half of Nigeria's total domestic energy consumption. In 1989 its share was about 65%. This alone is enough to highlight the importance of the sector in the

Nigeria energy system. However, an analysis of the final energy composition of this consumption is even more revealing.

According to Oladosu and Adegbulugbe (1994), the energy consuming activities in the sector are cooking, lighting and operation of electrical appliances (non-substitutable electricity). In 1989, the shares of these activities in final energy consumption were 91%, 6-3% respectively. Total final energy consumption was 487PJ. The major energy carriers are fuel wood, kerosene, Liquefied Petroleum Gas (LPG) and electricity. Small amounts of charcoal and coal are also used. Fuel wood is mainly consumed in this sector and accounted for over half of total natural energy consumption in 1989. A small amount is consumed in rural industries and the commercial sector. This means that fuel wood constitutes about 80% of total residential final energy consumption as illustrated in Figure 4.

## Discussion

**The effects of energy use on climate:** The United Nations Framework Convention on Climate Change (UNFCCC, 2002) calls for stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The actual level at which atmospheric CO<sub>2</sub> stabilization is achieved will depend on the product of several factors, known together as the KAYA IDENTITY (Hoffert *et al.*, 1998):

Where

Mc	=	$N (GDP/N)(E/GDP)(C/E)$
Mc	=	CO <sub>2</sub> emitted from fossil fuel combustion
N	=	Population
DP	=	Gross domestic product
E/GDP	=	Energy intensity in N year $\$/\text{year}^{-1}$
C/E	=	Carbon intensity = the weighted average of the carbon-to- energy emission in kg factors of all energy sources $\text{kg}/\text{year}^{-1}$

The level of atmospheric CO<sub>2</sub> stabilization that can be achieved in this century will depend on all these factors (Hoffert *et al.*, 1998). In the developing world, because of the projected rapid growth rate in energy use, achievable increases in energy efficiency will have little impact in reducing total GHG

emissions (Pearson and Fouquet, 1996). Improvement in energy efficiency alone will not be sufficient to stabilize CO<sub>2</sub> at reasonable target values. Meeting CO<sub>2</sub> stabilization goals will require a simultaneous decrease in carbon fuels as a proportion of total energy. New carbon free sources of energy will be required to decrease carbon intensity (Hoffert *et al.*, 1998).

**The effects of climate change on energy supply and demand:** The impacts of climate change on supply and demand will vary greatly by region. For example, in the United Kingdom and Russia a 2-2.2°C warming by 2050 will decrease winter space-heating needs, thus decreasing fossil-fuel demand by 5-10% and electricity demand by 1-3% (Moreno and Skea, 1996). In the North eastern United States, summer time decreases in stream flow will reduce hydropower generation during that season (Linder, 1990).

In Nigeria, a 2-2.2°C warming by 2050 will increase dry season air-conditioning demand by 3-6% and electricity demand by 4%. At the same time, dry season decreases in stream flow will reduce hydropower generation during that season.

Model studies, assuming a 3-5°C increase in temperature by 2055, suggest that electricity demand and fuel costs will increase significantly because of climate change (Linder, 1990). Annual electricity energy demands will increase slightly by 4-6% by the year 2055. As a result of climate change, peak national demand will increase 16-23% above base case values, that is, above the increased demand due largely to population growth without climate change.

The costs of increasing electrical capacity to meet the increased demand due to climate change will be large. By 2055, the annual costs for capital, fuel and climate-induced modifications in utility operations will be 7-15% greater than costs without climate change.

An increase in electrical demand (much of it generated by fossil-fuel combustion) would make policies that limit GHG emissions more difficult to achieve. And with increased demand, the need to import power could affect the balance of payments of Nigeria's foreign trade.

Following its effect on runoff and stream flows, climate change will also affect hydroelectricity power generation. Hydropower supplies 2.3% of the world's total energy and 3% of Nigeria's electricity. The African drought of 1991 - 1992 led to a significant decrease in hydropower.

**Nigeria's efforts in mitigating climate change:** As a developing country of responsibility, Nigeria adopted series of policies and measures taking into account its specific national circumstances, making positive contribution to the mitigation of climate change. They include:

- Restructuring the economy, promoting technology advancement and improving energy efficiency. Since 1999, the government of Nigeria has paid more attention to the change of the economic growth pattern and the restructuring of economy and integrated the reduction of energy and other resources consumption, the promotion of clean production and the prevention and control of industrial pollution into its national industrial policies.
- Optimizing Energy mix by developing low-carbon and renewable energy
- Under national policy guidance and with financial support, the share of high grade and clean energy was improved by strengthening the development and utilization of hydropower, oil, gas and supporting the development and utilization of new and renewable energy including biomass, solar, geothermal and wind power.
- Launching national wide tree-planting and forestation campaign
- Since 1990, tremendous achievement has been made in tree-planting and a forestation along with the implementation of key forest ecological projects in Nigeria
- Strengthening laws and regulations and policies and measures relevant to addressing climate change
- To address newly-emerging issues in recent years, the National Assemblies have passed a member of laws to further reinforce the policies and measures relevant to addressing climate change
- Attaching great importance to climate change research and capacity building
- The government of Nigeria values its capability and capacity to support scientific studies and researches on climate change and constantly enhance them. It has implemented a number of key research projects with some Nigeria Universities such as climate change programmer with FUT, Minna

**Alternative energy sources (renewable):** Renewable energy is considered to be one of the pivotal “Wedges” that can combat global warming and stabilize the climate, through the reduction of carbon dioxide emissions. Alternative energy or Renewable Energy (RE) sources are not destroyed when we use the energy harnessed. Renewable energies are alternatives to traditional sources. They are different to fossil fuels or nuclear power, which must be consumed (coal or gas burnt in power stations, oil in transport, uranium in nuclear power) to release energy.

To utilize renewable sources requires developing technologies that harvest this energy. For instance, specific technologies like those below, are needed to efficiently convert natural processes into energy to power our societies. They include: Sunlight (solar power), wind, waves, tides (tidal power), flowing water (hydropower), geothermal heat, biological processes (biomass) including: Ethanol, palm oil, biofuels and biodiesel from algae. Nigeria is currently under utilizing its renewable (alternative) energy sources.

#### **Key areas for GHG Mitigation:**

**Formulate and implement relevant laws and regulations:** Vigorously strengthen energy legislation to establish and improve energy legal system, promote the implementation of Nigeria’s national energy development strategy, establish the legal status of medium and long term energy program, promote the optimization of energy mix, mitigate GHG emissions from energy production and transformation. Major policies and measures are as the following:

- Expedite the constitution and amendment of laws and regulations that are favorable to GHG mitigation;
- Strengthen research and formulate energy strategy program;
- Implement the Renewable Energy Law of Nigeria.

#### **Strengthen institutional innovation and mechanism construction:**

- Accelerate Nigeria’s institutional reform in energy sector;
- Further promote mechanism construction for renewable energy development. Based on the principle of integrating government guidance, policy support and market force, stable mechanism for

investment will be established through government investment, government concession and other measures.

**Intensify relevant policies and measures in energy industry:**

- Properly develop hydropower on the precondition of protecting the ecosystem;
- Actively promote the development of nuclear power;
- Expedite technology advancement in thermal power generation;
- Vigorously develop Coal-Bed Methane (CBM) and Coal-Mine Methane (CMM) industry;
- Promote the development of bio-energy;
- Actively support the development and utilization of wind, solar, geothermal and tidal energy.

**Strengthen the development and dissemination of advanced and suitable technologies:**

- Technologies for the clean and efficient development and utilization of coal-as such, emphasize the research and development of highly-efficient coal mining technologies and supporting equipments, efficient power generation technologies and equipment such as heavy-duty gas turbines, Integrated Gasification Combined Cycle (IGCC), high-pressure, high-temperature ultra supercritical unit and large-scale supercritical circulation fluid bed boilers; vigorously develop coal liquefaction, gasification and coal-chemistry and other technologies for coal conversion, coal gasification based multi-generation systems technology and carbon dioxide capture, utilization and storage technologies;
- Exploration, exploitation and utilization technologies of oil and gas resources;
- Nuclear power generation technology-Research and master fast reactor design and its core technology, including nuclear fuel and structural material related technology;
- Renewable energy technology. Prioritize the development of low-cost and scale exploitation and utilization technologies, including the development of large scale wind-power generation equipments, high performance and low-cost photovoltaic battery technology,

solar thermal power generation, integrated solar energy building technology and biomass and geothermal energy development and utilization technologies;

- Power transmission and distribution and grid safety technologies. Prioritize the research and development of large-capacity.

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## Introducing a Common Currency in Central Franc Zone: Is it Appropriate?

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*This article examines the suitability of the currency union in the Central Franc Zone (CFA) relative to business cycles and trade. Optimum currency area (OCA) criteria have been employed to determine the suitability of currency integration. This paper also develops a procedure for application of OCA theory to CFA and examines the criteria, taking into account the endogeneity among variables. Establishment of a currency union and elimination of nominal exchange rate variability may result in large gains in active trade flows and convergence of business cycles. Adoption of the Euro is preferable to the dollar for each CFA country.*

**Keywords:** business cycles, CFA, common currency, exchange rate, trade

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### Introduction

The origin of the CFA franc arrangement dates back to colonial times when the local government decided to employ currency in the dependent territories to avoid the need to bring currency stability. At the end of World War II, two issuance houses were in charge of currency for the French colonies in Africa. Prior to independence, these institutions were renamed *Banque Centrale des Etats de l'Afrique de l'Ouest* (BCEAO) and *Banque Centrale des Etats de l'Afrique Centrale et du Cameroun* (BCEAC). Even after independence, the BCEAO and BCEAC remained in place, led by France, with their headquarters in Paris. For those newly independent

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countries that opted to stay within the franc zone, the main aspects of their currency problems remained with the former colonial power.

Today, the principal members of the CFA franc zone are France and the two African economic and monetary unions that developed from the country groups served by the two issuance houses: the Communauté Economique et Monétaire en Afrique Centrale [CEMAC, with the BEAC (Banque des Etats de l'Afrique Centrale) as its central bank] and the West African Economic and Monetary Union (WAEMU, with the BCEAO as the central bank). CEMAC has six members: Cameroon, the Central African Republic, Chad, the Republic of Congo, Equatorial Guinea, and Gabon. WAEMU has eight members: Benin, Burkina Faso, Cote d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, and Togo. The CFA franc zone links three currencies: the CFA francs issued separately by each bank and the Euro. Both CFA francs are limited to the Euro, previously to the French franc, at the same rate per Euro. However, CFA francs are issued by two distinct central banks that are independent from each other. Each CFA franc is nominally convertible into the Euro, but they are not directly convertible into each other. France guarantees the peg of the CFA franc to the Euro [1].

A striking aspect of the economic landscape of the CFA franc zone is heterogeneity not only between the two unions but even within each group. Although the CFA franc is based on shared history, the level of regional economic integration has remained low [2]. The production structures and macroeconomic and structural indicators for WAEMU and CEMAC differ significantly. Compared to Europe, the CFA's diversity is quite substantial. The economy of the Central African zone depends significantly on oil prices, whereas that of the West African zone depends on a more diverse set of agricultural commodities. For example, according to Abdih and Tsangarides, both WAEMU and CEMAC, the economic fundamentals explain most of the exchange rate movements [3]. This presents further questions about the long-term viability of the CFA franc. The optimum currency theory proposed by Mundell [4] and Kenen [5] may not be suitable for this area. However, the 14 countries have introduced a common currency. There may well be other economic conditions and benefits beyond the framework of Mundell and Kenen for the introduction of a single or common currency in the CFA.

This article focuses on business cycles and trade intensity and considers whether or not the currency union in CFA countries is suitable relative to these aspects. The paper reports on an empirical examination of the criteria of traditional OCA theory in connection with trade.

This paper is structured as follows: section 2 reviews the current state of OCA theory and considers the relationship between business cycles and trade, taking into consideration endogeneity among economic variables, then identifies further variables for participation in the common currency area. Section 3 discusses OCA indices. Finally, this paper ends with a summary.

## **OCA Theory and Its Application to CFA: Theoretical Background**

OCA theory has been employed to examine whether or not currency integration is suitable especially in Europe. Although few direct empirical studies have addressed the benefits and costs of the CFA franc arrangement, a more general strand of literature considers the real effects of nominal exchange rate arrangements to determine whether there is a systematic difference in economic performance between fixed and floating exchange rate systems. The consensus seems to be that fixed exchange rates lead to lower inflation and more fiscal discipline in developing countries; the direct effects of the nominal exchange rate regime on growth differs among studies and is mostly not statistically significant. For the CFA franc zone specifically, reduced inflation benefits are confirmed by Masson and Pattillo [6]. The exchange rate system and the common monetary institutions have been credited with helping the zone for many years to achieve lower inflation and more macroeconomic stability than other countries in Africa. There may well be second-round benefits; there is agreement in the literature that lower inflation in itself can provide important additional advantages for the stability of the economic situation and longer-term benefits for financial development.

OCA theory, which was developed by Mundell [4], McKinnon [7], and Kenen [5], has been a popular tool for the analysis of currency integration, particularly with reference to the Economic and Monetary Union (EMU) in Europe.

OCA theory considers several criteria. First, it stresses the importance of similarities among business cycles or shocks. Asymmetric business cycles and shocks require policy guidance. Second, OCA theory considers degree of openness. A country where local trade accounts for a high proportion of domestic output can profit from participation in a common currency area. A third consideration in OCA theory is factor mobility. High labor mobility facilitates adjustment to the adverse effects of asymmetric shocks and reduces the pressure for exchange rate adjustments. Finally, product diversification is proposed as an alternative. A country that produces highly diversified products is less vulnerable to sector-specific shocks. A new criterion for OCA has been introduced recently [8, 9].

For the first and second criteria, there has been some discussion regarding their validity. This paper focuses on these points. Closer trade relations may result in a convergence of business cycles. Moreover, similar business cycles create good conditions for policy integration and the creation of a common currency union. On the other hand, Frankel and Rose [10] suggested that the two criteria are endogenous. Eichengreen [11] showed the existence of endogeneity of OCA criteria. Krugman [12] and Bayoumi and Eichengreen [13], on the other hand, pointed out that as countries become more integrated, they specialize more. Frankel and Rose [10] showed that in some cases, the correlation between two countries' output increases unambiguously with increased intensity of trade links between the countries. It is important to keep in mind that it is not trade intensity alone that induces the convergence of business cycles. This paper takes this into account in accordance with Frankel and Rose [10].

## Empirical Test

This paper employs empirical tests to examine OCA theory criteria as follows:

$$\log \text{corr} (E_i, E_j) = a + b \log (TI_{ij}) + u_{ij}, \text{ where } TI_{ij} = T_{ij}/(T_i + T_j) \quad (1)$$

where  $\text{corr} (E_i, E_j)$  stands for the correlation of economic activity. This paper uses gross domestic product (GDP) as an indicator of economic activity.  $TI$  denotes the bilateral trade (export plus import) intensity between countries  $i$  and  $j$ .  $u_{ij}$  represents the myriad influences on bilateral activity correlation,

and  $a$  and  $b$  are the regression coefficients to be estimated. All of the data are yearly. The sample period is from 1995 to 2008. The data are from the IMF's Direction of Trade Statistics and International Financial Statistics. Of course, the object of interest is coefficient  $b$ . The sign of  $b$  tells us whether the correlation of economic activity is endogenous to trade and whether the correlation of economic activity is low or high. The sign of the coefficient deserves particular notice because it qualifies the economic importance of the effect.

Some countries are likely to follow their monetary policy with important trading partners. In this case, they lose the ability to set monetary policy independently from their neighbors. An ordinary least squares (OLS) regression of bilateral activity may be inappropriate in some cases. To identify such circumstances, I employ an instrumental variable method. The regressions are instrumented by exogenous variables of trade flows. This analysis uses a gravity model. The variables used in the two-stage OLS are (log of) income, income per capita, distance, and geographic adjacency, which are typically used with gravity models. The result is as follows:

$$\begin{aligned} \log \text{corr} (E_i, E_j) &= 0.703 + 0.092 \log (T_{ij}) + u_{ij} \\ (16.95) \quad (2.984) \\ \text{S.E.: } 0.204 \quad \text{adj.R}^2: 0.322 \end{aligned}$$

At this stage, trade intensity has a significant and positive effect on the correlation of business cycles. The business cycles of industrial production seem to be somewhat better explained by trade.

Next, trade structure is taken into account. Trade intensity alone may be insufficient for analysis of the correlation of economic activity. It may be important to take into account the endogeneity. Frankel and Rose [10], Kalemli-Ozcan [14], Sorensen and Yosha [15], and Krugman [12] stressed the importance of trade structure versus the endogeneity hypothesis of OCA criteria. The estimated equation is as follows:

$$\log \text{corr} (E_i, E_j) = a + b \log (T_{ij}) + c \log (TS_{ij}), \text{ where } TS_{ij} = 1 - (\sum_i |X_{ij} - M_{ij}|) / (\sum_i (X_{ij} + M_{ij})) + u_{ij} \quad (2)$$

where TS stands for trade structure as measured by the Grubel-Lloyd indices. X and M denote exports and imports.

Equation (2) also can be estimated using two-stage OLS using the same industrial variables. The variables in this instance are the same as in equation (1). The result is as follows:

$$\log \text{corr} (E_i, E_j) = 0.699 - 0.011 \log (T_{Iij}) + 0.117 (TS_{ij}) + u_{ij}$$

(16.125) (-0.629) (6.724)

S.E.: 0.283 adj.R2: 0.359

The coefficients of trade structure are highly significant in the specification. Insofar as the countries with close trade links have highly similar trade structures, the endogeneity hypothesis of OCA criteria is confirmed. This case reveals that trade intensity has no direct effect on the correlation of business cycles. Therefore, the analysis drops the term trade intensity from estimated equations. The result is as follows:

$$\log \text{corr} (E_i, E_j) = 0.652 + 0.088 \log (TS_{ij}) + u_{ij}$$

(28.012) (7.608)

S.E.: 0.203 adj.R2: 0.535

The results show that the correlation of business cycles of trading partners is not driven by the simple aggregation of shocks transferred between the countries via direct trade channels. Not only the direct effect of bilateral trade but also the structure of foreign trade induces the synchronization of countries' business cycles. Again, when describing the CFA franc zone, the countries may tend to specialize in producing different products, which should make them more susceptible to asymmetric shocks and, in line with the OCA theory argument, less suited for a common currency. This high degree of economic diversity should be discussed in the context of the argument about endogeneity of the OCA criteria.

## The Endogeneity Hypothesis of OCA Criteria and Indices of OCA

Most CFA countries have gradually increased intra-trade. They have relatively open economies. Increased bilateral trade intensity may lead to the divergence of business cycles if the increase in trade is due to the increased specialization as predicted by traditional OCA theory.

The development of these countries has been strongly influenced by growing exports to developed countries. The convergence of developed countries and other countries has increased recently.

Recently, many studies have been published about the analysis of Central and Eastern Europe (CEE) countries. The reason is that soon after participation in the EU in 2004, the new EU member states will have to consider a timetable for accession to the Economic and Monetary Union (EMU). Some studies such as Esrin and Urga [16], Boone and Maurel [17, 18], Korhonen [19], and Fidrmuc [20] have applied the same kind of method to this area. Comparing these studies, the correlation is generally high. Some CFA countries have a lot of signs of convergence with developed countries.

In this section, I use equations estimated in the previous section to evaluate the potential correlation of business cycles. Table 1 is the result.

**Table 1:** Comparison of business cycles of CFA countries and Euro zone/U.S.

	<b>Euro Zone</b>	<b>U.S.</b>
<b>CEMAC</b>		
Cameroon	0.58	0.43
Central African Republic	0.72	0.60
Chad	0.47	0.46
Congo Republic	0.58	0.34
Equatorial Guinea	0.56	0.28
Gabon	0.68	0.64
<b>WAEMU</b>		
Benin	0.51	0.48
Burkina Faso	0.69	0.48
Cote d'Ivoire	0.75	0.63

Guinea-Bissau	0.46	0.49
Mali	0.59	0.51
Niger	0.57	0.48
Senegal	0.62	0.58
Togo	0.62	0.46

In general, to use the local currency is more reasonable than the adoption of the U.S. dollar for each CFA country. However, some countries have produced different results. The differences are not large. Trade between the unions is low and each union imposes its external tariff. Capital flows between the zones are restricted, and the exchange of banknotes is prohibited. Further effort would be needed to implement a more appropriate zone, which may have merit. These are not surprising results given that globalization of economic activity and significant progress in the coordination of economic policy has been ongoing. Bayoumi and Eichengreen [13] showed that correlation in CEE countries and Germany were higher in the 1990s.

However, potential business cycle correlations for some countries exhibit small differences. Some countries need a fast convergence of business cycles to introduce a common currency, which requires greater openness and higher shares of trade. Less convergence will be predicted for some countries than for other CFA countries. Adoption of the Euro for the currency union is generally appropriate.

## Conclusions

This paper considered whether or not the currency union in CFA countries is suitable from the view of business cycles and trade. There is some doubt about whether there is a causal relationship between trade and business cycles. Frankel and Rose [10] demonstrated that trade links alone do not ensure the convergence of business cycles if countries are not sufficiently similar. This paper provides one solution.

If a common currency is introduced, the gain in active trade flows and convergence of business cycles, from elimination of nominal exchange-rate variability through the formation of a currency union, would be large. Many countries have been satisfied with the criteria of OCA for the Euro

area. In the choice of currency integration, I conclude that the Euro is more logical in some cases than the U.S. dollar. This debate has been characterized by a multitude of policy proposals. For example, whether or not economic growth will be realized is a primary consideration [21]. It is not sufficient to employ OCA theory alone.

With increasing financial globalization, volatile oil and raw materials prices, and some difficult regional security problems, the CFA franc arrangement now confronts great challenges. Among them are, for example, the prolonged, real appreciation of the currency brought about by the movement of the Euro against the U.S. dollar and significant changes in export prices for the two unions. A strong exchange rate undermined export competitiveness in 2007 and 2008. All but one of CEMAC's members are oil exporters with production and price increases reflected in sizable oil booms in some countries. In contrast, there have been sharp declines in world prices for cotton, the main export of some WAEMU countries. Both unions also face the costs and disruptions of regional conflict and the related political and socioeconomic instability of some of their members. This influence may impact the CFA zone in OCA theory. Also, the risks for these countries can be concentrated in sovereign debt sustainability in Europe. These Euro zone countries have close ties with economies at risk [22]. Further research will be needed not only from academic fields but also from policy authorities and the business world.

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## Serempathy: A New Approach To Innovation. An Application To Forty-Six Regions Of Atlantic Arc Countries<sup>1</sup>

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*This research provides a new theoretical approach to innovation called Serempathy: Serendipity (which is achieved by chance) + Empathy (putting your self in the other). Serempathy relies on collaborative relationships between: University, private companies and public administration. In this theoretical approach adds chance to scientific discovery and an environment of empathy. Ideas aren't self-contained things; they're more like ecosystems and networks.*

*The work also provides data processed in recent years (2004-2006) for forty six Atlantic Arc Regions (the forty regions of countries: United Kingdom, France, Portugal and Spain), overall and in different clusters, providing relevant empirical evidence on the relationship between Human Capital, Technological Platform, Innovation, Serempathy and Output. In the econometric and statistical modeling is considered especially for forty regions of the Atlantic Arc.*

**Keywords:** Serempathy, development, Atlantic Arc, regions

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## Introduction

This research studies the role of Human Capital, Technological Capital and Relational Capital among the generation of innovation, production and its economics effects in terms of sales and employment for each region. This is done through a general economic model composed of a basic equation that has as *exogenous variables* the Human Capital, Technological Capital and Relational Capital in order to explain the innovation as *endogenous variable*.

The operation of the innovation generation process consist in that aside from the right combination of Human Capital and Technological Capital, there are other relational, cultural and institutional regional factors, this is what we will call Relational Capital, which affects to the understanding and support of Human and Technological Capital and generates in combination with them, innovation and acts at the same time generating economic effects over the output in terms of units, over the sales and the generation of employment.

The estimation of the model adopted is done by using econometric techniques from the available data concerning the variables involved regarding the forty-eight regions of the Atlantic Arc belonging to the following countries: United Kingdom, Ireland, France, Spain and Portugal. It also compares the estimations of the model for various definitions of Human, Technological and Relational Capital, in order to analyze its impact on innovation.

Finally factors affecting the production of Human, Technological and Relational Capital of the generation of innovation between the European countries are analyzed in detail and conclusions are extracted from the obtained results.

## Literature Review

The role of Human and Technological Capital in the economic growth has been a topic of growing interest and debate between economics, geographers and other social researchers. Some of the most significant researches on these issues are listed below.

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At the beginning of economic theory it was thought that the natural wealth of a region or country was the main determinant factor of growth. Subsequently, the natural resources were replaced by all kind of infrastructures, mainly of transport, made by man. With the industrial revolution and the subsequent theories of Solow (1956, 1957) technological progress becomes key explanatory factor. Nowadays, after the main contributions of Lucas (1988), we tend to think that the main factor of growth is the Human Capital, understood in a fairly broad sense. By these we mean that when talking about Human Capital we should not think exclusively in education, experience and skills of workers: we tend to consider the innovative capacity and human values. Even in the line of New Institutional Economics we can think of the quality of the institutions as a cause of the economic growth. Basically these are the factors of modern growth theory, especially that which has been developing since the mid-eighties until today.

For a long time, Technology and Human Capital have been considered as the driving forces of economic growth. In this regard, Solow's (1970) work stands out which highlights the relevance of the effect of technological change on the economic growth.

Jacobs (1961, 1969) studies were focused on the transference of knowledge in cities. In his reasoning, cities play a crucial role in the economic development through the interaction between people and the generation of new products and new technology.

Later, Romer (1986, 1987 and 1990) establishes the connection between knowledge, human capital and economic growth through his endogenous economic growth model, arguing that investments in Human Capital create externalities and increasing returns.

The seminal endogenous regional model of Lucas (1988) shows that cities act transferring knowledge and generating powerful human externalities that increase productivity and boost the economic growth.

Also, the connection between Human Capital and regional growth is supported by a large body of empirical evidences contrasted at national and regional levels. In the same thread of thought, recent researches (Barro (1991); Glaeser et al (1995); Glaeser (1998; 1999; 2000a y 2000b); Simon (1998), Glaeser et al (2001); Rauch (1993); Young (1998); Eaton and Eckstein (1997); Black and Henderson (1998); Glendon (1998); and Shapiro (2006))

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have empirically contrasted Lucas speculation, stressing the role of human capital and economic growth.

Berry and Glaeser's (2005) work highlight the growing gap over the past decades in levels of human capital between regions among U.S.A. Finally, Florida (2002a, b, c; 2005a and b; and 2006) has advocated the need to better understand the factors that generate innovation and creates a new concept of Creative Capital which is what enables territories to attract talent. He concludes that the Creative Capital operates more as a dynamic flow or a static stock.

This research argues that what are really relevant are the collaborative relationships that exist between universities, private companies and public administration. The university provides a grounding of Human Capital, scientifically trained, that adequately related to private enterprise can generate open innovation. However, it is still necessary the relationship between private companies and public administration to implement the discovery and become a reality. The link and liaison between the Human Capital and Technological is the Relational Capital, and that link is collaborative and appropriate when done with creativity.

## **The Data**

The European Commission in order to track innovation in European regions has made a recent report (2009) which includes lots of indicators for the years 2004 and 2006 made with the same definitions and methodology. There is an earlier work from 2003 with different definitions that does not allow its expansion to the 2004 and 2006 years. It has been taken the arithmetic mean of each variable for both 2004 and 2006. In total, the battery of indicators is fifteen for a total of forty-eight regions belonging to the following Atlantic Arc countries: UK, Ireland, France, Spain and Portugal. This paper contains a comparison of the battery of the fifteen indicators for the forty-eight Atlantic Arc regions.

## **Human Capital**

As mentioned above, to obtain an index of Human Capital of the forty eight regions of the Atlantic Arc, the following two indicators are

combined: Tertiary Education and Life-long learning. From the arithmetic mean of the values of these indicators for the years 2004 and 2006 the Human Capital index has been developed.

*Table 1. Human Capital Indexes for the regions of the Atlantic Arc*

Region	Country	Human Capital Index	Tertiary education 2004-2006	Life-long learning 2004-2006
Galicia	es11	4.49	4.24	4.75
Principado de Asturias	es12	4.24	4.12	4.36
Cantabria	es13	3.95	3.72	4.17
Pais Vasco	es21	6.39	6.13	6.64
Comunidad Foral de Navarra	es22	5.05	4.86	5.24
La Rioja	es23	3.5	3.58	3.41
Aragón	es24	4.55	4.37	4.72
Comunidad de Madrid	es3	4.98	4.99	4.98
Castilla y León	es41	4.82	4.73	4.92
Castilla-la Mancha	es42	3.52	3.29	3.74
Extremadura	es43	3.31	3.14	3.49
Cataluña	es51	3.94	3.89	3.99
Comunidad Valenciana	es52	4.48	4.39	4.57
Illes Balears	es53	3.51	3.16	3.87

Andalucia	es61	3.87	3.8	3.95
Región de Murcia	es62	4.06	4.04	4.09
Canarias (ES)	es7	4.24	4.19	4.28
Île de France	fr1	6.02	5.83	6.2
Bassin Parisien	fr2	3.67	3.59	3.76
Nord - Pas-de-Calais	fr3	4.09	3.96	4.22
Est	fr4	4.13	3.99	4.27
Ouest	fr5	4.24	4.11	4.37
Sud-Ouest	fr6	4.42	4.23	4.61
Centre-Est	fr7	4.42	4.34	4.5
Méditerranée	fr8	4.21	4.21	4.2
Norte	pt11	1.83	1.75	1.9
Algarve	pt15	2.34	2.37	2.32
Centro (PT)	pt16	1.99	1.94	2.04
Lisboa	pt17	3.38	3.34	3.43
Alentejo	pt18	1.41	1.4	1.43
North East (England)	ukc	6.38	6.25	6.51
North West (England)	ukd	6.46	6.39	6.52

Yorkshire and The Humber	uke	6.45	6.45	6.46
East Midlands (England)	ukf	6.52	6.45	6.6
West Midlands (England)	ukg	6.43	6.33	6.53
Eastern	ukh	6.48	6.43	6.52
London	uki	8.37	8.07	8.66
South East	ukj	7.23	7.19	7.28
South West (England)	ukk	6.82	6.65	6.99
Wales	ukl	6.64	6.67	6.6
Scotland	ukm	7.45	7.36	7.53
Northern Ireland	ukn	6.08	6.06	6.09

*Source: Regional Innovation Scoreboard. 2009 (Data 2004-2006).*

Table 1 shows the magnitudes for the different regions of the Atlantic Arc analyzed reach the synthetic index of Human Capital of the Atlantic Arc as well as the different simple indexes that compose it.

It is worth noting the following results:

- 1) Leader regions in relation with the global or synthetic index with the Human Capital are: London, South East, South West (England), Scotland, Île de France, País Vasco, Madrid, Northern Ireland y Navarra.
- 2) Middle regions with relation with the Human Capital index are: Galicia, Castilla León, Asturias, Cataluña, Cantabria, Canarias, Sud-Ouest, Centre-Est, Ouest y Mediterranée.

- 3) Regions with low level of Human Capital index are Bassin Parisien, Lisbon, Algarve, Alentejo, Norte y French Overseas Departments.

## Technological Capital

The indexes used to obtain the synthetic index of the Technological Capital are the following two: Public R&D expenditures and Business R&D expenditures.

*Table 2. Technological Capital Indexes for the Regions of the Atlantic Arc*

Region	Country	Technological Capital Index	Public R&D Expenditures 2004	Business R&D Expenditures 2004
Galicia	es11	4.65	5	4.3
Principado de Asturias	es12	4.24	4.34	4.14
Cantabria	es13	3.53	3.71	3.35
Pais Vasco	es21	5.16	4.1	6.22
Comunidad Foral de Navarra	es22	5.77	5.39	6.14
La Rioja	es23	3.93	3.35	4.5 <sup>1</sup>
Aragón	es24	4.36	4.16	4.55
Comunidad de Madrid	es3	6.15	6.27	6.03
Castilla y León	es41	4.61	4.52	4.7 <sup>1</sup>
Castilla-la Mancha	es42	3.39	3.43	3.35
Extremadura	es43	4.19	5.15	3.22

Cataluña	es51	5.34	5.05	5.62
Comunidad Valenciana	es52	4.92	5.58	4.26
Illes Balears	es53	2.8	3.27	2.32
Andalucia	es61	4.59	5.35	3.83
Región de Murcia	es62	4.29	4.52	4.06
Canarias (ES)	es7	3.91	4.74	3.08
Île de France	fr1	7.39	7.18	7.6
Bassin Parisien	fr2	4.74	3.71	5.77
Nord - Pas-de-Calais	fr3	4.16	4.4	3.93
Est	fr4	5.49	5.3	5.68
Ouest	fr5	4.96	4.68	5.24
Sud-Ouest	fr6	6.95	6.85	7.05
Centre-Est	fr7	6.64	6.19	7.09
Méditerranée	fr8	6.38	6.93	5.83
Norte	pt11	4.23	4.63	3.83
Algarve	pt15	2.24	3.19	1.28
Centro (PT)	pt16	4.16	4.57	3.74
Lisboa	pt17	5.3	6.02	4.58

Alentejo	pt18	3.6	3.78	3.41
North East (England)	ukc	4.7	5.15	4.26
North West (England)	ukd	5.57	4.29	6.85
Yorkshire and The Humber	uke	4.74	5.15	4.33
East Midlands (England)	ukf	5.83	5.25	6.41
West Midlands (England)	ukg	5.62	5.85	5.39
Eastern	ukh	7.46	6.31	8.61
London	uki	5.05	6.27	3.83
South East	ukj	7.55	7.99	7.12
South West (England)	ukk	5.97	5.58	6.36
Wales	ukl	5.06	5.44	4.68
Scotland	ukm	5.58	6.19	4.98
Northern Ireland	ukn	4.45	4.29	4.61

*Source: Regional Innovation Scoreboard, 2009 (Data 2004-2006).*

Table 2 shows the magnitudes for the different European regions analyzed that reach both the synthetic index of the Technological Capital and the different indexes that compose them.

The main findings in relation to the Technological Capital are:

- 1) Some regions of the UK are the top positions in the ranking of technology, measured by the global technology indicator. These

- regions are: South East, East Midlands (England), West Midlands (England) and North East (England).
- 2) Other fifteen regions are situated reasonably well in a medium level respect of the global technology indicator. These regions are: Madrid, Yorkshire and the Humber, Scotland, Wales, Northern Ireland, Ceuta, Asturias, Cantabria, Border, Midlands and Western, Pais Vasco, Aragón, Méditerranée, Alentejo and Algarve.
  - 3) Last positions of the ranking are occupied by: Bassin Parisien, Nord-Pas-de Calais, Ouest, Castre-Est, Navarra, La Rioja, Sud-Ouest, Centro (PT), Regiões Autónomas dos Açores and Madeira and French Overseas Departments.

## Relational Capital

The relational capital synthetic index is compiled from the following two indicators: sum of all SMEs innovation in-house and the sum of innovative SMEs collaborating with others.

*Table 3. Relational Capital Indexes for Regions of the Countries of Atlantic Arc*

Region	Country	Relational Capital Indexes	SMES Innovating In-House 2004	Innovative SMES Collaborating With Others 2004
Galicia	es11	2.88	2.87	2.89
Principado de Asturias	es12	3.21	3.8	2.62
Cantabria	es13	3.43	4.14	2.71
Pais Vasco	es21	4.79	5.06	4.53
Comunidad Foral de Navarra	es22	4.81	5.1	4.53

La Rioja	es23	3.53	3.77	3.3
Aragón	es24	3.97	4.32	3.62
Comunidad de Madrid	es3	3.31	4.28	2.35
Castilla y León	es41	3.28	3.71	2.85
Castilla-la Mancha	es42	2.51	3.82	1.2
Extremadura	es43	2.37	2.34	2.4
Cataluña	es51	4.12	5.25	3
Comunidad Valenciana	es52	3.37	4.01	2.73
Illes Balears	es53	1.84	2.21	1.46
Andalucía	es61	2.52	3.58	1.47
Región de Murcia	es62	3.37	4.35	2.4
Canarias (ES)	es7	2.27	3.18	1.35
Île de France	fr1	2.41	0.79	4.03
Bassin Parisien	fr2	1.7	0.09	3.31
Nord - Pas-de-Calais	fr3	1.92	0.26	3.57
Est	fr4	2.79	0.64	4.93
Ouest	fr5	2.53	0.84	4.23
Sud-Ouest	fr6	3.02	0.88	5.16

Centre-Est	fr7	2.44	0.6	4.29
Méditerranée	fr8	2	0.5	3.5 <sup>1</sup>
Norte	pt11	4.11	5.36	2.85
Algarve	pt15	4.54	5.26	3.83
Centro (PT)	pt16	5.78	7.83	3.73
Lisboa	pt17	5.98	7.45	4.5 <sup>2</sup>
Alentejo	pt18	4.88	6.16	3.59
North East (England)	ukc	5.68	6.25	5.11
North West (England)	ukd	5.68	6.31	5.05
Yorkshire and The Humber	uke	5.79	6.33	5.26
East Midlands (England)	ukf	6.35	6.87	5.8 <sup>2</sup>
West Midlands (England)	ukg	5.62	6.1	5.13
Eastern	ukh	6.14	6.97	5.3
London	uki	5.06	5.38	4.74
South East	ukj	5.99	6.51	5.47
South West (England)	ukk	6.03	6.5	5.56
Wales	ukl	5.9	6.73	5.06

Scotland	ukm	5.31	5.82	4.79
Northern Ireland	ukn	4.56	5.3	3.81

Source: *Regional Innovation Scoreboard. 2009 (Data 2004-2006).*

The main results obtained in terms of Relational Capital for the regions studied are:

- 1) East Midlands (England); Eastern; Lisbon; South West (England), Wales, Centro (PT), Scotland, Northern Ireland, País Vasco and Navarra in the top positions.
- 2) Alentejo, Norte, Cantabria, Asturias, Rioja, Madrid, Ceuta, Cataluña and Murcia follow them closely with intermediate levels.
- 3) Est, Ouest, Sud-Ouest, Ile de France, Centre-Est, Méditerranée, French overseas departments, bassin Parisien, Nord-Pas-de-Calais and Melilla occupy the last places in Relational Capital.

## The Model

### Structure

Towards a better understanding of the questions raised, we created a general model of generation of innovation for the European countries, in order to isolate and analyze the independent effects of Human, Technology and Relational Capital with other variables of innovation and economic development.

A schematic representation of the general theoretical model of Serempathy and the regional development is shown in Figure 1. The arrows identify the hypothetical structure of relationships between key variables.

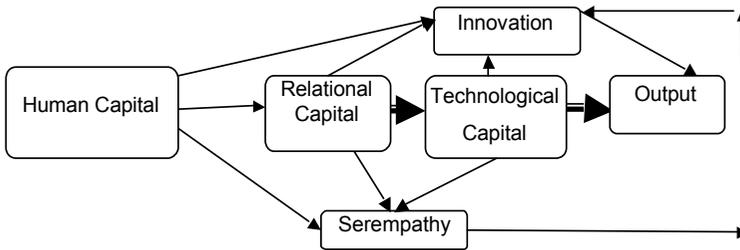


Fig. 1. Structure of the relationships between Human, Technological and Relational Capital with Serempathy, Innovation and Output

Next, we will proceed to estimate the contribution of Human Capital, Technological Capital and Relational Capital. We will use an aggregate production function which contains as a variable to explain the innovation or throughput and as explanatory variables three defined factors of production such as Human Capital, Technological Capital and Relational Capital. Such function will be of type:

From the cause and effects relations of the previous model we estimate a production function of innovation as follows:

$$I = f(y_1, y_2, y_3) = \gamma y_1^{\alpha_1} y_2^{\alpha_2} y_3^{\alpha_3}; (\gamma > 0, \alpha_i > 0) \tag{1.1}$$

In the previous equation (1.1) innovation is represented by I, and it is explained by three production factors as the effect of Human Capital, represented by  $y_1$ , the investment in Technological Capital represented by  $y_2$ , the investment in Relational Capital which we will call  $y_3$ . The expression (1.1) will take now logarithms and obtaining the following specification:

$$\text{Log } I_{i,t} = \gamma + \alpha_1 \text{Log } y_{1,i,t} + \alpha_2 \text{Log } y_{2,i,t} + \alpha_3 \text{Log } y_{3,i,t} + \varepsilon_{i,t} \tag{1.2}$$

Where  $\varepsilon_i$  represent the mistakes of the econometric estimation, while the rest of variables have been previously defined. Table 5 shows the results of the estimation of the equation (1.2).

The model helps to unravel which is the way of production for the approach of innovation.

The model adopted also enables the stimulation and analyze of the effects of relationships (Relational Capital) which are influenced by various institutional and regional cultural factors – for example, the university, the private companies and the empathy and support of the public

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administration, on the geographic distribution of innovation and in turn, on the economic growth.

We have included the Innovation Index from Eurostat, this index is an indicator based on the number of patents registered and applied by the EPO (European Patent Office) per million of population with source Eurostat.

This research will use a set of econometric and statistical techniques, carrying out multivariate regressions of Human Capital, Technological Capital, Relational Capital and Innovation, in terms of number of patents in order to study the nature of the causal relations between the variables in the model of stages described above.

## The Variables

Variables used in this model are the following:

- Dependent Variable: Innovation (Patents)

The dependent variable used in the model to approximate of innovation, index of the number of patents, also explained in the previous section.

Independent variables are the following:

- Indexes of Human Capital

It was considered in order to represent the talent, Human Capital 1 index, as a traditional or conventional indicator of the Human Capital, measured as the population with tertiary education aged between 25 and 64 years with source Eurostat, and the Human Capital 2 as an index from the participation for every 100 people in learning throughout life between 25 and 64 years with source Eurostat.

- Indexes of Technological Capital

It includes a technology variable to account the independent effects of the technology in the regional development. Besides studying the effect of each of the indicators used to obtain the Technological Capital index: share of GDP in public expenditure on R&D source Eurostat (Technological Capital 1), share of GDP in private expenditure on R&D source Eurostat (Technological Capital 2).

- Indexes of Relational Capital

Another set of explanatory variables correspond to the measures of Relational Capital, understood not only as reducing barriers for the entry of Human Capital, but the facilitation and collaborative support. Relational Capital among the regions and the concentration of these opening factors create an economic, social and cultural environment more open to innovation.

For this variable a synthetic index of Relational Capital was used from the following two indicators: Sum of SMEs with intern innovation activities, with cooperation between workers and managers (in-house) (Relational Capital 1) and Sum of SMEs with extern collaboration with other companies (Relational Capital 2) with source Eurostat.

## Results

Next we will proceed to estimate the different equations proposed in the model. Some regions were excluded because there were no data available of some variables as seen in previous section.

### *Estimation of the model*

The results of the estimation of the equations (1.2) from the model adopted, relating to the Innovation (Number of Patents), are shown in table 5.

From these results the following conclusions can be drawn:

A) In this case, as in the rest of the literature on innovation, the variable that best approximates innovation is the number of patents.

B) The ratio between the Human Capital and innovation is significant. Technological Capital has a direct effect on the innovation.

C) Relational Capital of the innovative collaborations between companies is also significantly related with the innovation.

D) Innovation is explained reasonably well by the three key variables – Human, Technological and Relational Capital.

*Table 4. Estimations for the second equation of the model in logarithms.*

	Equation (1.2.a)		Equation (1.2.b)	Equation (1.2.c)
Independent Variables	LnInnovation (Patents)		LnInnovation (Patents)	LnInnovation (Patents)
Intercept	-0.3856 (-2.9521)		-0.3311 (-2.5634)	-0.3463 (-2.7225)
LnHuman Capital(Ln $y_1$ )	0.4387 (3.3746)		0.2449 (1.9361)	-
LnHuman Capital (Tertiary Studies)(Ln $y_{11}$ )	-		-	0.2027 (2.2990)
LnTechnological Capital(Ln $y_2$ )	1.1589 (5.9310)		0.8662 (3.5927) -	0.2396 (3.4127)
LnRelationalCapital(Ln $y_3$ )	-0.2952 (-2.2830)		-	-
LnRelationalCapital (Colaborations in innovation with enterprises) (Ln $y_{31}$ )			0.2539 (1.8913)	0,3504 (2,7813)
LnRelational Capital (Innovation in-house) (Ln $y_{32}$ )	-		-	-
Observations	N	38	38	38
Estatisticals	R <sup>2</sup>	0.6671	0.6802	0.6927

Source: Authors. Some regions have been removed from the samples for instance Ceuta and Melilla, in Spain, the Azores Island and other autonomous islands, Algarve and Alentejo in Portugal, the islands of the French Protectorate and regions with extremely low innovation data in France, as well as data of Scotland and the two regions of Ireland.

## Serempathy Indicator

From table 5 equation (1.2.a) the results obtained for the countries of the Atlantic Arc in relation to the so-called Serempathy Indicator of the regions of the countries studied are shown in table 6.

$$S_t = [ 1 - (\hat{I}_t - I_t)$$

Where  $S_t$  is Serempathy in period  $t$ ,  $\hat{I}_t$  is estimated innovation in equation 1.2.a and period  $t$ , and  $I_t$  is real innovation in period  $t$ .

*Table 6. Serempathy Indicator for the Regions of Countries of Atlantic Arc*

Region	Country	Serempathy
Galicia	es11	0,9351
Principado de Asturias	es12	0,8900
Cantabria	es13	0,8413
País Vasco	es21	0,9413
Comunidad Foral de Navarra	es22	1,0576
La Rioja	es23	1,2153
Aragón	es24	0,9629
Comunidad de Madrid	es3	0,9263

Castilla y León	es41	0,9024
Castilla-la Mancha	es42	1,2123
Extremadura	es43	0,3702
Cataluña	es51	1,1520
Comunidad Valenciana	es52	1,0034
Illes Balears	es53	1,3121
Andalucía	es61	0,7418
Región de Murcia	es62	0,7923
Canarias (ES)	es7	0,8157
Île de France	fr1	1,1435
Bassin Parisien	fr2	1,4182
Nord - Pas-de-Calais	fr3	1,2199
Est	fr4	1,1539
Ouest	fr5	1,2001
Sud-Ouest	fr6	0,9346
Centre-Est	fr7	1,1934
Méditerranée	fr8	1,0566
Norte	pt11	0,9800
Centro (PT)	pt16	0,8523

Lisboa	pt17	0,8034
North East (ENGLAND)	ukc	1,0628
North West (ENGLAND)	ukd	0,9766
Yorkshire and The Humber	uke	1,0304
East Midlands (ENGLAND)	ukf	0,9608
West Midlands (ENGLAND)	ukg	0,9853
Eastern	ukh	1,0106
London	uki	1,4211
South East	ukj	0,9618
South West (ENGLAND)	ukk	0,9900
Wales	ukl	0,9316

*SOURCE: Own elaboration from table 5 equation (1.2.a) 2009 (DATA MEASURED BETWEEN 2004-2006)*

Based on the results obtained of this synthetic indicator of Serempathy of all the regions of the Atlantic Arc countries, the following conclusions can be drawn:

- 1) The Atlantic Arc regions, particularly the English seem to have a significant Serempathy indicator. Thus, South East, Eastern, London, East Midlands (England), North West (England). In France, Spain, and Portugal are the leading regions in Serempathy indicator Bassins Parissin, Ile de France, Nord-Pas de Calais, Rioja, Castilla La Mancha, Navarra, Cataluña, Valencia and Illes Ballears, Norte and Centro.

- 2) The rest of English regions together, and some of the regions of other countries, also get average scores. This is the case of Lisbon, Wales, Yorkshire and the Humber, País Vasco, Galicia, Asturias, Castilla-León, Aragón, Cantabria and Madrid.
- 3) The remaining regions are facing significant competitive challenges in aspects of Serempathy.

In particular, the lower Spanish regions in Serempathy are: Extremadura, Andalucía and Murcia.

## Conclusions

This research proposes the existence of a new drive of innovation and with it not only of the sales based on the accumulation of knowledge but in the collaborative relations between universities, companies and public administration.

This research analyzes the causes of innovation which are empirically contrasted for the case in all the regions of the Atlantic Arc countries: UK, Ireland, France, Spain and Portugal.

The main conclusions of the modeling performed are as follows:

- A. With our database of the Atlantic area regions we have found empirical evidences that the Human Capital, particularly the core that we call tertiary education equivalent to university degree level, best explains the innovation that other non-traditional measures of talent based in other university and non-university educational levels.
- B. Human Capital has a direct effect over the Throughput (Number of patents). Human Capital operates as a crucial intermediate variable in the process of economic growth which connects the factors outside the market or related to technological innovation.
- C. Technological Capital or the technological platform has in this case, as in the traditional literature, an important role in generating innovation.
- D. It is surprising the high explanatory power of the new Relational Capital, defined here. It seems that collaborative relations between

universities, private companies and public administrations, this is, the Relational Capital, are significantly associated with the generation of Innovation. The analysis shows that the relational factors (outside the market) have positive and relevant role in the production of Technological Capital and Innovation. Collaborative relations are outside the market; however, they provide the greasing between the innovation as an idea and its practical implementation. Certain regional conditions of relational type seem to play a significant role and encourage the creation of an environment or habitat that can link the Human Capital with the Technological Capital and generate innovation. The three factors of Human, Technological and Relational Capital do not operate in competition with each other, but they tend to act playing complementary roles in the process of generating innovation.

- E. All these results lead us to affirm that innovation in Europe is the result of a cumulative process which involves a combination of factors of the type identified by Jacobs, Florida, Clark and Glaeser, with Human Capital externalities identified by Lucas, Romer and Glaeser, and the role of Technological Capital noted by Romer and Solow. However, there is something more, is what we call Relational Capital, not reflected so far in the economic literature, which is what in our opinion stimulates the impulse of the implementation of innovation.

In short, it can be concluded that innovation in European countries takes place through a process based in the following stages:

The first stage generates Human Capital formed in public and/or private institutions.

In the second stage, the concentrations of Human Capital and Technological Capital generate research, technological development and even technological innovation.

In the third stage, relational, institutional and non-market factors (Relational Capital), such as, collaborative relationships between universities, private companies and public administrations, positively affect the production of Human Capital and its relation with the Technological

Capital, so that there is here a real boost to the generation of technological innovation.

Finally, higher levels of technological innovation lead to higher levels of regional economic development.

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## Modern Techniques for Online Promotion of Banking Services and Products

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*Promote bank services and products involve above all extensive market studies, identifying consumer needs, consumer segmentation, improving the quality of supply - all for shaping a promotional campaign to be completed by attracting new customers.*

*Today, organizations are struggling to shape new ways to create their own image, strong among consumers, which means a model of education with valuable content.*

*Communication with current customers or potential achieved through well thought out promotional strategies.*

*Due to the changes through which humanity moves into the digital world technology - internet, mobile and social media networks, which have major impact on consumer behavior and institutions?*

*Markets are conversations; The Clue train Manifesto was said in the book fundamental Internet era, that marketing is not the key element in an institution, BUT THE ABILITY TO ACHIEVE EFFECTIVE COMMUNICATION.*

**Keywords:** promotion, bank, internet, modern techniques, consumers

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## Introduction

Currently, banks should be concerned about turning over online environment and its integration in institutional or commercial promotion strategies. This banking institutions online platforms and blogs of interest, leads to an advantageous solution for active banks. The current economic and social situation in our country has improved banks' ability to recognize ideas, be open to proposals coming from both inside and outside the institution and capacity to adapt their strategies to changing market.

The financial crisis has brought major changes in approach and attract customers. Consumer behavior has changed, are more careful about how they spend their budgets, but also want to satisfy their consumption needs as well and therefore will seek primarily to provide benefits and services purchased products are very attentive to the quality price.

Presence and interaction with current and potential customers through social networks can increase the visibility of the institution or service/product and can even improve the perception among consumers. This on social networks has the following advantages: relationships with potential customers, direct feedback objective, the attachment to the brand, transparency, strong component of online PR.

Times more volatile, with high pressure on the results and a minimum tolerance to investment next year, a Facebook page relevant, well-designed blog can recruit so many customers to attend the launch of services or products.

## Promote bank services and products through the brand

American Marketing Association defines brand as follows: *"A brand is a name, term, sign, symbol, a drawing or a combination of these elements, aiming to identify the goods or services of a seller or group of sellers and differentiate these goods and services from the competition"*.

The brand is used for centuries as a means of distinguishing the goods of a particular producer of those of another producer. Today, we can say that the role of brand is to improve consumers' lives and enhance the value of a financial institution.

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No institution does not obtain the desired success if existing products and services are similar to those of competitors. It is therefore necessary to follow market positioning and differentiation. Positioning involves a thorough investigation of the influence on the institution tutor elements as target market must offer and immediately recognize the distinctive image of the institution.

Professionals in advertising, Al. Rise and J. Trout [1] popularized the term positioning and you have "seen" as an exercise in creativity with an existing product, *"Positioning starts with a product. A commodity, service, company, institution, even a person ... But positioning is not about what you do with the product, but what you do with the mind possible buyer. In other words, place the product in the minds of potential customers"*.

Good positioning means and image design offers the institution, so as to occupy an important place in the minds of consumers and that will lead to profit maximization. This helps to define marketing strategies, thus clarifying the essence of the brand, resulting in the successful creation of a *"customer-focused proposals value"* [2], persuasive motivational factors for the target market to buy services/products.

Consumers evaluate two different services/products the same brand. Based on information obtained from their past experiences, and marketing programs, consumers choose the brand, which meet the need or desire.

In the sphere of development of new banking products and services, adapt and use modern technology plays an important role in the intensification of competition and fierce fight for the preservation and/or expansion of market segments. Concerns for the introduction of new banking products and services aim to: build a strong brand in the minds of customers by creating genuine differences - today's difficult aspect, but in the future banks should take this into account. The mark may indicate a certain level of quality, so customers can easily choose the service/product the next time [3].

Promoting a services and banking products through the brand management involves the brand, which includes: brand positioning (identification and implementation), analysis, planning and implementation of brand marketing, evaluation, development of brand value.

Promotion strategies are based on customer segmentation and market positioning of products and services offer.

Slogans banks have influence in brand building. They are created by advertising agencies in connection with the bank's local values, but also with the international positioning with the ability of a service/product on the market, creating a segment of a target, a starting point, the an image against which will be judged by customers all the services/products launched under that brand. In banking, as institutions are reluctant to target a single segment, launching and services/products in different segments, their slogan refers mostly to human value, ethics, principles of life or the general needs of clients induce reliability and financial strength. There are banks that do not identify with a certain brand, but rather they promoting services/products and less focus on image campaigns.

We present these examples of slogans of some banking institutions in Romania to promote their brand, communicating the value and its peculiarities: thus, the Romanian Commercial Bank has chosen the slogan: "BCR - *We think alike*". Message not limited to a niche market in terms of services promoted: they promote and sell packages of products such current account, home loans, personal loans, services for SME's, internet banking.



BRD - GSG "More simply", expressing a modern vision.



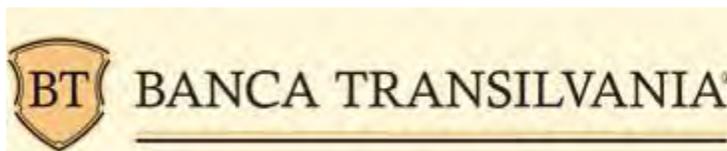
Raiffeisen Bank "*We succeed together*", based on accessibility, efficiency, accountability and trust, provides a full range of products and services for individuals, SME's and large corporations via multiple distribution channels:

banks, ATM and EPOS networks, phone banking (Raiffeisen Direct), mobile banking (myBanking) and internet banking (Raiffeisen Online).



BT (among the strongest brands in Romania 40). BT brand awareness has determined that while BT to build an entire "family of brands", launching on the market impact and other brands such as BT Cafe first banking coffee shop in Romania; Academy BT national center for information and training and integration of new employees in the organization; BT Golf Cup golf tournament, BT Cross; Cluj has a soul ([www.clujlaresuflet.ro](http://www.clujlaresuflet.ro)) whose business foundation is dedicated to young people aged between 14 and 20 years who come from disadvantaged families and orphanages. Another famous brand is Club Romanian entrepreneurs ([www.btclub.ro](http://www.btclub.ro)), through which BT offers business segment support, consulting and networking program for more than 12,000 members.

The most famous unconventional means to promote bank products and, implicitly, BT, is the character "Zanul". It proved to be a very suitable solution for what BT and proposed, that is to "meet" small business wishes. Due to the notoriety of this character, the area of influence has widened and the retail segment, but also for other types of campaigns, and the choice proved inspired.



Millennium Bank: "Life inspires us" is more than a slogan is to define the spirit that underlies the business itself. Express an attitude that is manifest in everyday activity, both in normal times and in times of crisis. The slogan is based on principles that communicate sustainability, credibility, efficiency, quality, dynamism, modernity, innovation, boldness, ambition, and forecast future success.



Today, because of signs the financial crisis event, we believe it is important to maintain constant communication, consistency and transparency in particular. We consider this relevant to any company, not just banks. Further, the banks will show a higher attention on cost control and allocation of budgets and communication promises to target segments. Consumers will continue to show greater sensitivity to the quality/price ratio in buying services/products.

We believe that banking institutions have continued to communicate intensively in the conditions in which their competitors have chosen to no longer do, got a huge advantage with much lower investment than would be necessary in normal market conditions.

In order to develop, banks need to show consistency in building the image that started it, not to make sudden changes, be responsible, and strengthen its market position and always come up with something new to attract new customers.

**Brands that survive in the market and are recognized by consumers are those who promote ideas such as accountability, authenticity, transparency and integrity and are able to show courage, proposing positioning or differentiating true and original promises.**

## **Virtual communities - techniques to promote profitable**

Virtual communities are social networks that are already known for their power to influence public opinion to shape important decisions and to connect businesses with consumers thus reaching many target segments. Revolution digital technology provides access to tools and platforms to present opinions and messages of a potential global audience. To keep up with current trends banking institutions trying to adapt their marketing strategies and tactics of the most popular social network in Romania (Facebook, Hi5, Twitter, Neogen, Yahoo, Netlog, TPU.ro). Currently, Facebook is the phenomenon of time in social media and social networking community attracting much attention marketing and communication, companies wishing to use this network in their promotion campaigns.

Involvement in such social networks and effective communication requires an optimization of costs, and establish a long-term strategy.

*For consumers online environment offers:* higher purchasing power, comprehensive range of services and products, large volume of information in real time, great opportunities for exchange of services or products, etc.. Consumers have greater confidence in what they read on blogs, forums or social networks, and before you get your service/product shall be documented on the Internet.

*For institutions offering a range of opportunities:* exploiting a new channel and sales information, gathering information about market, customers, competitors, potential customers (example: consumers posts can turn into a valuable source of information for that institution, which has everything interest to be present in social environments), adapting the tenders according to information gathered from databases to the number of those who have visited your site etc. Today, brands are surrounded by true virtual communities, and institutions make great efforts to integrate user groups.

For now, promoting bank products and services through social networks is used sparingly compared to other areas or categories of services. Our opinion is that this virtual world should not miss the bank's communication policy with current and potential customers. Such messages reach consumers where they spend their time where they are more willing to interact and where you can see them in real-time responsiveness. Currently, banks should continue to be concerned about turning the online environment and its integration in institutional or commercial promotion strategies. This banking institutions online platforms and blogs of interest, leads to an advantageous solution for active banks.

The current economic and social situation in our country has improved banks' ability to recognize ideas, be open to proposals coming from both inside and outside the institution and capacity to adapt their strategies to changing market.

Companies that choose to promote their services/products through the online environment must be prepared to respond, first of all to:

- That can provide consumers so that they consider valuable and important information sent to their needs and desires;

- 
- Be prepared to answer user questions and encourage debate on brand/product;
  - How to integrate other communication channels to promote through social networks;
  - What techniques and tools to use to attract attention;
  - How to assess their success through online presence in such environments.

Below are some examples of banking institutions in Romania have confidence to be active in virtual communities:

- BRD already integrated information channel in the communication mix, which you attach to the component of each media campaigns;
- BT has a profile on Facebook (where customers can meet "Zanul" bank with BT Foundation, Cluj has a soul), on Twitter, LinkedIn, YouTube (can be seen some commercials on TV institution);
- BCR - are present in the online environment with "School Project Money", a financial education program that combines elements of entertainment and information applied, but the idea of developing long-term responsibility on consumers to manage their money;
- OTP Bank - have enabled the campaign "The Right to Read" on Facebook. Here fans can read daily updates about the campaign and have the opportunity to participate in contests awarded, with important collections of books.

As a conclusion, we can say that the presence and interaction with current and potential customers through social networks can increase the visibility of the institution or service/product and can even improve the perception among consumers. This on social networks has the following advantages: relationships with potential customers, direct feedback objective, the attachment to the brand, transparency, strong component of online PR.



<http://www.facebook.com/pages/BRD-Groupe-Societe-Generale>



<http://ro-ro.facebook.com/BancaTransilvania>



<http://www.facebook.com/ING>

## Promotion through search engines

Thanks to advanced technologies, today the Internet is required in any marketing strategy, as an online advertising media should not be neglected. Search engines are the web's first resource in use worldwide, the world underwent a radical and permanent transformation. Mention the rules of a new era [4], including:

- *"Customers have the power, is hearing voices all over the world, with huge impact on some institutions, in seconds;*
- *People can find each other, wherever they are, and can gather around you or against you;*
- *Industry table was replaced with the niche;*
- *Markets are conversations - the key element in any organization is not marketing, but the ability to communicate;*
- *Has gone from an economy based on shortages to one based on abundance;*
- *Giving consumers the opportunity to work with the institution - in creating, distributing, promoting or endorsing products - you can get rewards in the market today;*

- *The key is not to own pipeline, people, products or intellectual property. **The key is open to consumers**".*

Marketing done through search engines leave the buyer profile, continue to build a special content for them to express the issues facing the current customers of the institution and presentation of content in one of the online forms that customers prefer (blogs, Web sites, social networks etc.). End consists of carefully thought content indexing in search engines. Next, we present the essentials of marketing done through search engines:

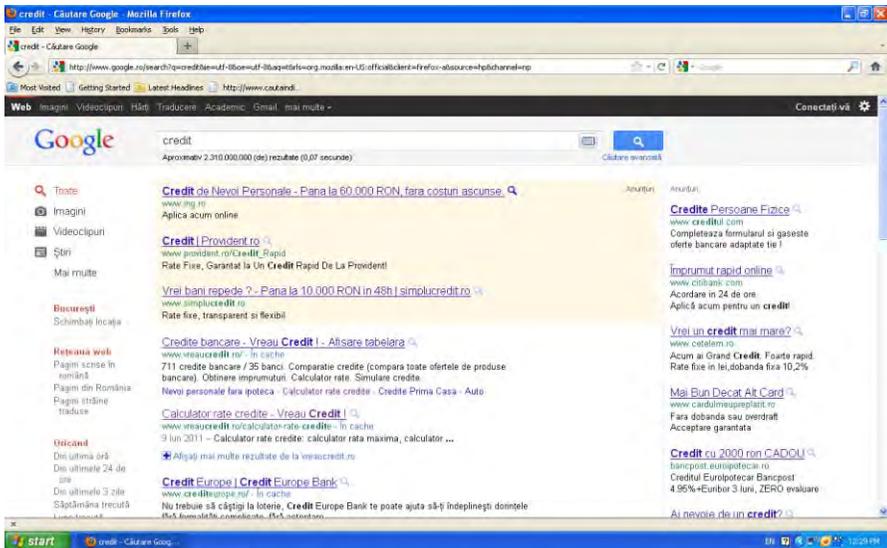


**Achieving marketing via search engines use search engines** is to go directly to buyers. The most popular search engines are Google and Yahoo. (Google - is the first media job, is a network and platform, unlike Yahoo, which is a portal).

**SEO = Search Engine Optimization**, website optimization site that is so in the first results to be displayed when search is done after keyword phrases.

**Advertising on search engines (Google AdWords and Yahoo Search Marketing)** = method of advertising on the Internet, through which companies can promote their business by posting ads on Google and Yahoo search engines and Web partner sites. Online advertising is a paid service and operates on a cost per click (pay per click), in other words, the customer is charged only when a user browsing the Internet clicked on the link for the ad displayed by the search engine. Through this system of advertising, ads are displayed only for customers seeking Internet users certain keywords related to the company.

Example: Banks in Romania who have chosen to promote through Google, the largest search engine in the world, services/products and paid six dollars to use key word "credit" in ads. Keyword Price is determined by auction companies who wish to promote on Google. (Example: \$ 6 for the word "credit" established following a bid, represents the amount paid by a company to appear in first position, the first results page when users search for the word. If people click on ads bank whose advertising was displayed on search engine, then the company is charged with six dollars per click. Promotion depends on budgets, but companies, those which allocate smaller amounts will not appear in top positions on search engine keyword search based on "credit".



As you can see in the box at Google, in a time of 0.07 seconds was found after searching about 2,310,000,000 pages made: the word "credit". In 2010, the top five players in the financial industry with the largest presence in Google AdWords are Unicredit Tiriac, ING Bank, Cetelem, Bancpost and Millennium Bank.

Golden Words	
The most expensive keywords on Google AdWords banking industry in January 2010	
<i>Credit</i>	6.08
<i>Online Credit</i>	3.38
<i>Internet banking</i>	3.30
<i>Loans</i>	0.50
<i>Quick Loans</i>	0.27
<i>Refinancing Loans</i>	0.26

*Sursa: Today's*

Romanian search engines are listed below: Kappa; 123Start; [Axanet](#); [Bumerang](#); [Ce faci](#); Cyberspace; Ebony; Index 2000; [Linkuri](#) (a new search engine Romanian), Master Business (Business search engine only); Portal; Run (real estate), Star net; Start; [Startpage](#); Prima Pagina; Millennium Portal; go2web; [Acasa](#); Culture RO; Go2Net; GoFind.RO; H2RO; Home.

Publishing interesting content on the Internet is a convenient choice for any institution, but consumers must be motivated and want to access to information. Marketing success through the use of search engines comes from attracting customers directly to the content itself that we seek. For this, institutions need to choose the name services/products, including the company are so easy to find on the web through search engines.

The conclusion that emerges from the set is that, the institutions, to be found on the web need a unique identity to stand out and be known to search engines. The advantage is that by promoting services/products through search engines may increase the number of customers.

### **Evaluating the efficiency of modern techniques to promote banking products and services**

Lately, banks and have increasingly focused on activities to promote the supply available. Survival on the market involve the banks conducting comprehensive market research, adapting the services and products based on consumer needs and desires, setting prices to enroll in the general market trend and identify the most appropriate distribution channels. All these activities benefit institutions by developing promotional campaigns

held constant. Banks turn to advertising to increase the number of new customers, maintain and motivate existing customers and to establish an image of the banking market to denote **safety, professionalism and trust**.

They aim to create a favorable image to be the moral capital in front of its customers through better communication system in place which, on the one hand, increase the efficiency of their activity and, on the other hand, the education while consumers of products/services bank.

Using modern techniques to promote banking products and services gain contour and Romania. Institutions have realized that to communicate over the Internet is a brand communication, very important in marketing, starting from research, market studies, competition, listening to consumers, and not least the dialogue with them.

We use the Internet to inform us and to make an informed decision for an acquisition. Use of this channel provides an opening to an incredible world of information.

Marketing, services and products through search engines is an effective way (in terms of costs) and very simple which facilitates access to reading the message addressed to a target market. It is a great tool for guiding clients in buying. Efficiency in the translated text messages should be thinking in terms of the buyer.

Companies to achieve desired results, you need to build Web pages with specific content, providing people access information they clear about the range of services and products.

## Conclusions

In the current economic conditions, we believe it is important to maintain constant communication, consistency and transparency in particular. We consider this relevant to any company, not just banks. Banking institutions will continue to show increased attention on cost control and allocation of budgets and communication promises to target segments. Consumers will continue to show greater sensitivity to the quality/price ratio in buying services/products.

We believe that banking institutions have continued to communicate intensively in the conditions in which their competitors have

chosen to no longer do, got a huge advantage with much lower investment than would be necessary in normal market conditions.

In order to develop, banks need to show consistency in building the image and created it, not to make sudden changes, be responsible, to strengthen its market position and always come up with something new to attract new customers.

Marketing success through the use of search engines comes from attracting customers directly to the content itself that we seek. For this, institutions need to choose the name services/products, including the company are so easy to find on the web through search engines.

Using modern techniques to promote banking products and services gain contour and Romania. Institutions have realized that to communicate over the Internet is a brand communication, very important in marketing, starting from research, market studies, competition, listening to consumers, and not least the dialogue with them.

The Internet allows customers to make comparisons between banking services and products on the market. Also, existing portals (example: Conso.ro Romania is the first financial portal) allows you to compare the cost of financial products, helping consumers choose the best offer, for more than five years, this portal helps increase awareness financial education of the population.

The conclusion that emerges from the set is that, the institutions, to be found on the web need a unique identity to stand out and be known to search engines. The advantage is that by promoting services/products through search engines may increase the number of customers.

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## The Macroeconomic Performance of Monetary Policies. A Stochastic Simulation Based on the Taylor's Rule

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*In this paper we try to check if and how the macroeconomic performances induced by a Taylor's rule based kind of monetary policy are (or not) more efficient than those effectively induced by the most important central bank's monetary policies. In this kind of respect, we use a simple three equations model: a Phillips equation, an aggregate demand equation and a fixing rule for the main interest rate. Based on historical simulation as well as on stochastic simulation, it turns out that macroeconomic performances, in terms of inflation and productivity gap, would be more stable and efficient if the Taylor's rule would be used by a certain central bank in fixing its main interest rate.*

**Keywords:** *Stochastic Simulation, Monetary Policy, Taylor's Rule, Central Banks, Macroeconomic Performance*

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### Introduction

The main purpose of this paper is to make some assessments concerning the transmission of the monetary policy in four countries: the United States of America (USA), Germany, France and Italy. In fact, we'll try to find out if a Taylor's rule-based mechanism in fixing the interest rates would (or not) fulfill some certain efficiency criteria. In this kind of respect, we will make a comparison, on historical basis, between the real

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macroeconomic effects under already done monetary policy and the macroeconomic effects induced by a monetary policy based on the Taylor's rule.

In order to make assessments on the monetary policies in those four countries, we used, firstly, the estimated model from [1], then, we added to this model a monetary policy rule of Taylor kind. This model, initially designed to be applied in US economy, can also be assimilated by the EMU members. Unlike the USA, the EMU members are forced to adopt a monetary policy that is very close to the monetary policy adopted by Bundesbank, before 1999, inside the European Monetary System and, after, inside the Eurozone – Germany being considered the main stabilizing EU member, in economic and monetary terms, as well. Besides, in [2], in order to put in evidence the main monetary policy regimes inside the European Monetary System, three representative groups of countries are identified. Due to the importance of the Deutsche Mark inside the former European Monetary System, Germany is considered as a group by itself. The second group contains Austria, Belgium and Netherlands. These countries are strongly dominated by Germany, in monetary terms. The former local currencies of these countries had, actually, no fluctuations versus Deutsche Mark and their monetary policies were pretty much the same like those of Bundesbank. The third group includes countries like France, Italy, Spain, Finland and Greece. Their former currencies suffered a lot of devaluations as well as quite long periods of free floating outside the European Monetary System. In our research we choose Germany, France and Italy. We have considered that these countries are good examples in offering an accurate image on the monetary policies inside the former European Monetary System and on the actual ECB monetary policy. The robustness of the Taylor rule was also previously tested in [3].

## **Empirical Estimations on the Monetary Policies Transmission Mechanisms in USA, Germany, France and Italy**

The model we have chosen is a simple linear one and it allows an easy analysis providing transparent results. A similar model was also tested in [4] and in [5]. Obviously, the model lacks some essential characteristics of the monetary policies implementation. Still, we strongly believe that the model is complex enough in terms of dynamics. Furthermore, the model catches a lot of characteristics of the macroeconomic policies. In [6] it's shown that, while an academic consensus concerning the structure of a

certain economy hasn't been reached, a model has to catch an as large as possible variety of macroeconomic parameters. The model is using a short-term interest rate as instrument of monetary policy. The model also includes an autoregressive expectations Phillips curve. The two equations of the model are [1]:

$$\pi_{t+1} = \alpha_{\pi 1} \pi_t + \alpha_{\pi 2} \pi_{t-1} + \alpha_{\pi 3} \pi_{t-2} + \alpha_{\pi 4} \pi + \alpha_y y_t + \varepsilon_{t+1} \quad (1)$$

$$y_{t+1} = \beta_{y1} y_t + \beta_{y2} y_{t-1} - \beta_r (\bar{i}_t - \bar{\pi}_t) + \eta_{t+1} \quad (2)$$

where  $\pi_t$  is the quarterly inflation that takes account of the GDP deflator ( $p_t$ ), measured in basis points ( $400(\ln p - \ln p_{t-1})$ ). The GDP deflator is used only in case of the US economy and in case of Germany, France and Italy, the Consumer Price Index (CPI) is used;  $\bar{\pi}_t$  is the four quarters average inflation ( $\frac{1}{4} \sum_{j=0}^3 \pi_{t-j}$ );  $i_t$  is the interest rate during one quarter period of time measured in basis points;  $\bar{i}_t$  is the four quarters average interest rate ( $\frac{1}{4} \sum_{j=0}^3 i_{t-j}$ );  $y_t$  is the difference between the real GDP ( $q_t$ ) and the potential GDP ( $q_t^*$ ) ( $100(q_t - q_t^*)/q_t^*$ ), and  $\varepsilon_{t+1}$  and  $\eta_{t+1}$  can be interpreted as being economic shocks.

The first equation establishes a relation between the future inflation and the difference between the real and potential GDP in the actual quarter and the inflation in previous quarters, as well. The link between the inflation in the next quarter and the inflation in previous quarters is an autoregressive representation of the expectations on inflation. During the analysis, we will not reject the hypothesis accepting that the inflation coefficients from the past might be equal to the unity. The second equation establishes a relation between the output gap in the next quarter and the output gap in the previous quarter and the difference between the average interest rate and the average inflation in the last four quarters. The third term of equation is a simple representation of the monetary policy transmission mechanism and, according to many central banks, could imply nominal interest rates, exchange rates or some other monetary aggregates. In fact, the second equation approximates all those variations during the entire process of monetary policy implementation. Data series concerning GDP, interest rate

and CPI were obtained from the statistics section of the central banks and from IMF International Financial Statistics. Data series concerning the potential GDP of Germany, France and Italy were obtained using the Hodrick-Prescott filter.

The goal of any (every) central bank is to keep the inflation under control and at as low as possible value (target) and to keep the output gap in a close proximity of a fixed low value (usually, the target value for the output gap is zero).

## The Obtained Results

The Results concerning the United States of America, estimated by using the method of least squares and the 1961-2010 data, are presented<sup>1</sup>. The Phillips equation, after estimations, has led to the following results:

**Table 1:** The output estimation for the Phillips equation  
 United States of America

Dependent Variable: PI				
Method: Least Squares				
Date: 10/11/10 Time: 13:09				
Sample: 1961:1 2010:1				
Included observations: 197				
$PI = MPILO + C(1) * (PI(-1) - MPIL1) + C(2) * (PI(-2) - MPIL2) + C(3) * (PI(-3) - MPIL3) + (1 - C(1) - C(2) - C(3)) * (PI(-4) - MPIL4) + C(5) * (GAP(-1) - MGAPL1) + U\_AS$				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.444875	0.071364	6.233872	0.0000
C(2)	0.075019	0.075387	0.995125	0.3209
C(3)	0.290272	0.075561	3.841558	0.0002
C(5)	0.155965	0.035046	4.450279	0.0000
R-squared	0.783163	Mean dependent var		3.682557
Adjusted R-squared	0.779721	S.D. dependent var		2.392191

<sup>1</sup> The results were obtained using EViews software.

S.E. of regression	1.122748	Akaike info criterion	3.089942
Sum squared resid	238.2462	Schwarz criterion	3.157563
Log likelihood	-294.1794	Durbin-Watson stat	1.985078

$$\pi_{t+1} = 0.44\pi_t + 0.075\pi_{t-1} + 0.29\pi_{t-2} + 0.195\pi_{t-3} + 0.155y_t + \varepsilon_{t+1} \quad (3)$$

The estimation of the aggregate demand equation made by the method of least squares has led to the following results:

**Table 2:** The output estimation for the aggregate demand equation  
 United States of America

Dependent Variable: GAP				
Method: Least Squares				
Date: 10/11/10 Time: 13:09				
Sample: 1961:1 2010:1				
Included observations: 197				
GAP=MGAPLo+C(1)*(GAP(-1)-MGAPL1)+C(2)*(GAP(-2)-MGAPL2)+C(3)*(R(-1)-MRL1) +U_IS				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	1.242516	0.068611	18.10946	0.0000
C(2)	-0.316347	0.068657	-4.607647	0.0000
C(3)	-0.047767	0.025662	-1.861397	0.0642
R-squared	0.902507	Mean dependent var		-0.357786
Adjusted R-squared	0.901481	S.D. dependent var		2.486296
S.E. of regression	0.780393	Akaike info criterion		2.357385
Sum squared resid	115.7126	Schwarz criterion		2.408100
Log likelihood	-224.4876	Durbin-Watson stat		2.075819

$$y_{t+1} = 1.24y_t - 0.31y_{t-1} - 0.05(\bar{i}_t - \bar{\pi}_t) + \eta_{t+1} \quad (4)$$

The model catches quite exactly the evolution of the aggregate supply and demand equation. The explanatory power of the aggregate supply equation ( $R^2$ ) is 78.3%, which means that that price evolution dynamics is 78.3% influenced by the factors we have taken into

consideration in the equation. The inflation is influenced only 15.5% by the output gap. Furthermore, the explanatory power ( $R^2$ ) is 90.2%, which means that production is 90.2% influenced by the factors we have been considered in the equation. The real interest rate (meaning the difference between the existing interest rate and the existing inflation rate) does influence only by 5% the production. The value of these coefficients shows that Federal Reserve (Fed) has had a monetary policy strategy that had targeted a long term inflationary stabilization as well as a sort of „general stabilization” concerning the output gap.

Concerning Germany, the equation results, also estimated by using the method of least squares and using 1971- 2010 data, are also presented. The Phillips equation, after estimation, has led to the following results:

**Table 3:** The output estimation for the Phillips equation – Germany

Dependent Variable: PI				
Method: Least Squares				
Date: 10/11/10 Time: 18:16				
Sample(adjusted): 1971:2 2010:3				
Included observations: 158 after adjusting endpoints				
$PI = MPILO + C(1) * (PI(-1) - MPIL1) + C(2) * (PI(-2) - MPIL2) + C(3) * (PI(-3) - MPIL3) + (1 - C(1) - C(2) - C(3)) * (PI(-4) - MPIL4) + C(5) * (GAP(-1) - MGAPL1) + U\_AS$				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.382111	0.080079	4.771689	0.0000
C(2)	0.171796	0.081687	2.103108	0.0371
C(3)	0.346225	0.081221	4.262777	0.0000
C(5)	0.086790	0.079655	1.089580	0.2776
R-squared	0.590628	Mean dependent var		2.805675
Adjusted R-squared	0.582440	S.D. dependent var		2.146209
S.E. of regression	1.386855	Akaike info criterion		3.517586
Sum squared resid	288.5052	Schwarz criterion		3.596467
Log likelihood	-266.8541	Durbin-Watson stat		2.016963

$$\pi_{t+1} = 0.38\pi_t + 0.17\pi_{t-1} + 0.35\pi_{t-2} + 0.10\pi_{t-3} + 0.08y_t + \varepsilon_{t+1} \quad (5)$$

For Germany, the explanatory power of the aggregate supply equation is smaller, being only of 59%. This fact could be explained by the after World War II price stability in this country. When the inflation is kind of inert, we may assume it could be influenced only by external shocks. Concerning the aggregate demand equation, its explanatory power is quiet stronger: 65,6%. The estimation of the aggregate demand equation, using the method of the least squares, furnished the following results:

**Table 4:** The output estimation for the aggregate demand equation – Germany

Dependent Variable: GAP				
Method: Least Squares				
Date: 10/11/10 Time: 18:16				
Sample(adjusted): 1971:2 2010:3				
Included observations: 158 after adjusting endpoints				
GAP=MGAPLo+C(1)*(GAP(-1)-MGAPL1)+C(2)*(GAP(-2)-MGAPL2)+C(3)*(R(-1)-MRL1) +U_IS				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.874834	0.078512	11.14264	0.0000
C(2)	-0.067330	0.082294	-0.818165	0.4146
C(3)	-0.072396	0.043493	-1.664532	0.0981
R-squared	0.656357	Mean dependent var		-0.000424
Adjusted R-squared	0.651805	S.D. dependent var		1.459149
S.E. of regression	0.861015	Akaike info criterion		2.557879
Sum squared resid	111.9434	Schwarz criterion		2.617040
Log likelihood	-193.9567	Durbin-Watson stat		1.934182

$$y_{t+1} = 0.87y_t - 0.06y_{t-1} - 0.07(\bar{i}_t - \bar{\pi}_t) + \eta_{t+1} \tag{6}$$

Concerning France, the results of the equations, also estimated using the method of the least squares and using 1979-2010 data, are also presented. The Phillips equation, after estimation, has led to the following results:

**Table 5:** The output estimation for the Phillips equation – France

Dependent Variable: PI				
Method: Least Squares				
Date: 11/11/10 Time: 18:21				
Sample(adjusted): 1979:2 2010:3				
Included observations: 126 after adjusting endpoints				
PI=MPILO+C(1)*(PI(-1)-MPIL1)+C(2)*(PI(-2)-MPIL2)+C(3)*(PI(-3)-MPIL3)+(1-C(1)-C(2)-C(3))*(PI(-4)-MPIL4)+C(5)*(GAP(-1)-MGAPL1) +U_AS				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.382508	0.088507	4.321768	0.0000
C(2)	0.145914	0.094015	1.552035	0.1233
C(3)	0.175281	0.094041	1.863877	0.0648
C(5)	0.111414	0.162967	0.683659	0.4955
R-squared	0.794605	Mean dependent var		3.615041
Adjusted R-squared	0.789427	S.D. dependent var		3.769584
S.E. of regression	1.729795	Akaike info criterion		3.965863
Sum squared resid	356.0707	Schwarz criterion		4.057316
Log likelihood	-239.9006	Durbin-Watson stat		1.999322

$$\pi_{t+1} = 0.38\pi_t + 0.14\pi_{t-1} + 0.17\pi_{t-2} + 0.31\pi_{t-3} + 0.111y_t + \varepsilon_{t+1} \quad (7)$$

The estimation, using the method of the least squares, of the aggregate demand equation has led to the following results:

**Table 6:** The output estimation for the aggregate demand equation – France

Dependent Variable: GAP				
Method: Least Squares				
Date: 11/11/10 Time: 18:21				
Sample(adjusted): 1979:2 2010:3				
Included observations: 126 after adjusting endpoints				
GAP=MGAPLO+C(1)*(GAP(-1)-MGAPL1)+C(2)*(GAP(-2)-MGAPL2)+C(3)*(R(-1)-MRL1) +U_IS				

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	1.183268	0.086649	13.65592	0.0000
C(2)	-0.317093	0.087954	-3.605212	0.0005
C(3)	-0.011795	0.015110	-0.780577	0.4366
R-squared	0.827144	Mean dependent var		0.008957
Adjusted R-squared	0.824263	S.D. dependent var		0.982543
S.E. of regression	0.411892	Akaike info criterion		1.087975
Sum squared resid	20.35856	Schwarz criterion		1.156565
Log likelihood	-63.91046	Durbin-Watson stat		2.175625

$$y_{t+1} = 1.18y_t - 0.31y_{t-1} - 0.01(\bar{i}_t - \bar{\pi}_t) + \eta_{t+1} \quad (8)$$

The model catches the evolution of both aggregate supply and demand in France. The inflation dynamics is 79.4% influenced by the factors included in the equation. The GDP dynamics is 82,7% explained by those factors.

For Italy, the results of the equations, estimated using the method of the least squares and using 1984-2010 data, are also presented. The Phillips equation, after estimation, has led to the following results:

**Table 7:** The output estimation for the Phillips equation – Italy

Dependent Variable: PI				
Method: Least Squares				
Date: 12/11/10 Time: 15:46				
Sample(adjusted): 1984:2 2010:3				
Included observations: 106 after adjusting endpoints				
PI=MPIL0+C(1)*(PI(-1)-MPIL1)+C(2)*(PI(-2)-MPIL2)+C(3)*(PI(-3)-MPIL3)+(1-C(1)-C(2)-C(3))*(PI(-4)-MPIL4)+C(5)*(GAP(-1)-MGAPL1)+U_AS				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.539354	0.093925	5.742365	0.0000
C(2)	-0.136191	0.105014	-1.296890	0.1977

C(3)	0.240628	0.104372	2.305493	0.0232
C(5)	0.073276	0.166433	0.440272	0.6607
R-squared	0.846829	Mean dependent var		5.145962
Adjusted R-squared	0.842187	S.D. dependent var		3.992447
S.E. of regression	1.586027	Akaike info criterion		3.798402
Sum squared resid	249.0326	Schwarz criterion		3.900721
Log likelihood	-191.6177	Durbin-Watson stat		1.856168

$$\pi_{t+1} = 0.53\pi_t - 0.14\pi_{t-1} + 0.24\pi_{t-2} + 0.36\pi_{t-3} + 0.07y_t + \varepsilon_{t+1} \quad (9)$$

The estimation of the aggregate demand equation, using the method of the least squares, has led to the following results:

**Table 8:** The output estimation for the aggregate demand equation – Italy

Dependent Variable: GAP Method: Least Squares Date: 12/11/10 Time: 15:46 Sample(adjusted): 1984:2 2010:3 Included observations: 106 after adjusting endpoints GAP=MGAPL0+C(1)*(GAP(-1)-MGAPL1)+C(2)*(GAP(-2)-MGAPL2)+C(3)*(R(-1)-MRL1) +U_IS				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	1.128117	0.096210	11.72560	0.0000
C(2)	-0.326227	0.094663	-3.446201	0.0008
C(3)	-0.023928	0.016474	-1.452436	0.1495
R-squared	0.754855	Mean dependent var		-0.073652
Adjusted R-squared	0.749903	S.D. dependent var		0.939312
S.E. of regression	0.469747	Akaike info criterion		1.355727
Sum squared resid	21.84559	Schwarz criterion		1.432932
Log likelihood	-66.14208	Durbin-Watson stat		2.027925

$$y_{t+1} = 1.12y_t - 0.32y_{t-1} - 0.02(\bar{i}_t - \bar{\pi}_t) + \eta_{t+1} \quad (10)$$

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Like in the France case, in the case of Italy the model catches quite accurately the evolution of both aggregate demand and supply equations. The inflation dynamics is 84.6% influenced by the factors included in the equation and the GDP dynamics is 75.4% influenced by those elements. The real interest rate influences only 2% the evolution of production.

## **A Possible Alternative to the Existing Monetary Policy Promoted by Major Central Banks**

Since Taylor presented a very simple rule of monetary policy conducting, two issues were, actually, discussed, both theoretically and empirically: the robustness and the efficiency of this rule. In this kind of respect, the main purpose of this study is to put together and compare the monetary policies of US Federal Reserve, Bundesbank, Banque Nationale de France and Bank of Italy and, through the last three, the European Central Bank, with an ideal monetary policy induced by the Taylor rule.

In order to assess the economic performance of these economies, the economic evolution was simulated by the Taylor's rule, in terms of GDP and inflation [3]. The analysis was made by using both historical and stochastic simulations. At the historical simulation, a change in the monetary policy strategy (a new rule in fixing the interest rate) is confronted with shocks that occurred in a certain period. We are in a position to find out, considering the model as accurate, if the alternative to the existing monetary policy could have better results.

The only problem that could occur concerns the robustness of the simulation. The historical results could depend on eventual shocks that may be not be representative for the future of the monetary policy even they are strong. The stochastic simulation tries to solve the robustness issue. A new series of shocks are generated, using new hypothesis on shock distribution. So, the performance of the new rule could be estimated on many different economies. Doing things this way we could compare the real „universe” of historical data on inflation and GDP with a Taylor's rule-based „alternative universe” built on simulated values of inflation and GDP.

In order to compare the real economic performance with the simulated one, we estimated once again the evolution of the US economy between 1961 and 2010, of the German economy between 1971 and 2010, of

the France's economy between 1979 and 2010 and of the Italy's economy between 1984 and 2010 and we have measured the economic performance through a function defined by the variations of inflation and output gap. There is no consensus if the monetary policy based on rules is more efficient, in terms of economic performance (inflation and output gap values and stability), than the discretionary one.

The inflation volatility is associated with poor performances of growth due to the incertitude the inflation induces in the consumers and the investors behaviour [7]. We will present the results of the economic re-evaluation, based on Taylor's rule.

Using the estimated model given by the equations 1 and 2, we have evaluated once again the economic evolution by adopting the Taylor's rule in fixing the interest rate. We took into account, during each and every period the estimated inflation and output gap shocks given by the equations 3 and 4 for the US economy, by the equations 5 and 6 for Germany's, by the equations 7 and 8 for France's and by equations 9 and 10 for Italy's. The Taylor's rule form used for this simulation is:

$$i_t = i_t^* + \pi_t + 0.5 * (\pi_t - \pi_t^*) + 0.5 * (y_t - y_t^*) \quad (11)$$

where  $i_t$  is the interest rate level,  $i_t^*$  is the long term equilibrium interest rate (usually based on historical observations),  $\pi_t$  is the inflation level,  $\pi_t^*$  is the inflation target,  $y_t$  is the level of GDP and  $y_t^*$  is the potential level of GDP.

## Comparison between the Real Trajectories with the Simulated Trajectories

The main conclusion is that the Taylor's rule would had better results than the real FED monetary policy (table 9). In case that the Taylor's rule would had been used, both the variations of output gap and inflation would had been smaller (the average output gap would had been -0,44, while the average inflation would had been 2,68 versus 3,68; the output standard deviation would had been 2,45%, and the inflation standard

deviation would had been only 1,39%). Similar results can be obtained in case of historical simulation.

**Table 9:** A macroeconomic simulation based on Taylor's rule (USA)

	Average			Standard deviation		
	Output gap	Inflation	Interest rate	Output gap	Inflation	Interest rate
Actual results	-0.36	3.68	6.01	2.48	2.22	3.30
Historical simulation	-0.44	2.68	5.13	2.45	1.39	2.81
Stochastic simulation	-0.28	1.22	3.05	2.32	1.93	4.71

In order to confirm these results and to avoid basing only on the historical simulation, the stochastic simulation was used by resembling inflation and output gap standard deviation data. All data were resembled 1000 times.

The simulation results in case of Germany (table 10) are kind of surprising. Historical simulation leads to similar results both for average and standard deviation. We may conclude that Bundesbank followed a rule that was very close to the Taylor's. The economic performance of the Germany's economy after the World War II is outstanding: low inflation volatility (1.85%) and low output gap volatility (1.47%). Also, the inflation level is very low (2.80%) as well as the deviation of the output gap from the natural level (0.01).

**Table 10:** A macroeconomic simulation based on Taylor's rule (Germany)

	Average			Standard deviation		
	Output gap	Inflation	Interest rate	Output gap	Inflation	Interest rate
Actual results	0.01	2.80	5.50	1.47	1.85	2.79
Historical	-0.07	2.45	5.32	1.47	1.81	3.31
Stochastic	-0.20	2.81	5.81	1.46	2.88	4.52

Also for France the study's results are pretty much the same (table 11).

**Table 11:** A macroeconomic simulation based on Taylor's rule (France)

	Average			Standard deviation		
	Output gap	Inflation	Interest rate	Output gap	Inflation	Interest rate
Actual results	-0.01	3.55	6.81	0.98	3.44	4.00
Historical	-0.05	3.43	7.13	0.98	3.42	5.38
Stochastic	-0.29	3.22	6.79	0.96	3.18	5.21

In case of Italy, the results are quite the same (table 12). The robustness of the Taylor's rule is well sustained by the satisfying results of the stochastic simulation. In case of Italy as well as in case of France, we have to notice the high values of the standard deviation both for inflation and output gap.

**Table 12:** A macroeconomic simulation based on Taylor's rule (Italy)

	Average			Standard deviation		
	Output gap	Inflation	Interest rate	Output gap	Inflation	Interest rate
Actual results	-0.08	5.17	9.43	0.93	3.72	5.50
Historical simulation	-0.21	5.06	10.48	0.95	3.75	5.71
Stochastic simulation	-0.60	4.39	9.00	0.93	2.87	4.87

## Conclusions

Our results are in line with all debates existing in modern economic literature concerning monetary policy decisions. Furthermore, despite the fact that monetary policy has multiple purposes (stabilizing the inflation and the output gap, but, also, the financial markets stability), we have at our

disposal a simple and comprehensive rule based only on two purposes. More else, looking at the existing financial situation, a monetary policy designed to stabilize a certain economic situation seems to be desirable.

Both in cases of historical and stochastic simulations, the resulting macroeconomic performances, in terms of inflation and output gap, have more efficiency and stability in case of using the Taylor's rule. Our study put, also, in evidence the robustness and efficiency of this rule.

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## Analysis of the Purpose of Using Internet in Iraq: A Multinomial Logit Model

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*Internet accessibility is positively correlated with infrastructure development and nature of government policies. Though Iraq has shown considerable increase in Internet connectivity, it constitutes only 10 % of its population. In this study, the significant factors determining the use and non-use of Internet have been identified and analyzed. The results revealed that human development, human capital, institutional and legal environment, existing technologies, government policy making and income levels affect the Internet accessibility. The non-Internet users mainly comprised from 12-25 years age group. Similarly, high school and diploma students constituted significant proportion of non-Internet users. Lack of awareness and poor access to Internet facility were quoted as the most significant factors that resulted in the poor Internet accessibility which were supported by the used multinomial logit model. Low income level of the people resulted in non-use of Internet. The use of Internet was found to be highest among those with high level of education. Hence, the measures like provision of ICT based training programs, effective government policy for prioritizing Internet in education sector and*

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*allowing most advanced Internet technologies in e-governance and increased efforts for enhancing human development and human capital would enhance the rate of Internet accessibility in Iraq.*

**Keywords:** *Multinomial logit, Internet use, Determinants, Purpose of use, Iraq*

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## Introduction

The phenomenon of globalization and liberalization resulted in significant improvement in information technology and telecommunication sectors in both developed and developing nations. More specifically, Internet access of the people has increased considerably over the last 10 years though it varied from one nation to the other nation (Todaro, 2009). However, it is confirmed that the rate of Internet development in any nation certainly contributes to its socio-economic development and hence it has immense significance (Chacko, 2000). The extent of Internet development and its access in any country is dependent upon the government policies related to the basic infrastructure development and budget allocation made towards the telecommunication sector (Tuomi, 2006).

Hippel (2006) also found that there exists a strong link between the policies of the government related to the telecommunication sector in general and Internet sector in particular and the rate of extent of development of Internet connectivity in any nation. In this context, one must remember that the phenomenon of globalization and liberalization facilitated more flexible policies of governments in both developed and developing nations because of which maximum opening up of the global economies was witnessed. Moreover, the country's geo-political environment affects the growth rate of infrastructure and science and technology and industry which in turn would influence the rate of development of Internet connectivity (Barber and Odean, 2001). This proved to be more significant in cases of developing nations like Iraq.

Iraq had to face a war with USA and other countries of multinational forces in the year 1991 and 2003 and it devastated its economy including health

services significantly (Furber and Johnstone, 2004). This affected the rate of development of basic infrastructure like telecommunication which in turn affected the status of Internet connectivity. Due to the war development in early 1990s, the international contacts of Iraq with several other nations were severely affected resulting in poor inflow of foreign funds and severe shortage of investment capital for its infrastructure like telecommunication which has affected Internet accessibility of the people significantly. The strict policies followed by the military regime of Saddam Hussein also led to poor development of Internet facilities in Iraq. The promotion of Internet was considered as stumbling block for the privacy and confidentiality of the administration and policies of Iraq during this period leading to poor Internet access.

Though Iraq has shown considerable increase in Internet connections from 12,500 in the year 2000 to 2,750,000 in the year 2008, still it constitutes only 10% of the Iraq population which is quite poor compared to the global average. In this study, the significant factors affecting the Internet accessibility and reasons for the low Internet access have been analyzed. There is a necessity for identifying the role of various factors like human development indices, human capital, institutional legal environment, existing technologies and government policy in the Internet accessibility in nations like Iraq. At the same time, the access of Internet is affected by cost, age, education level, and income. In general, nonusers of the Internet are more likely to be older individuals, and are more likely to have less education and lower household income than Internet users. Women also constitute major portion of the non-users of Internet in Iraq and the poor people and rural people have lesser access to Internet compared to rich and urban areas. The lack of access to Internet in rural areas due to the absence of Internet service providers and poor literacy rate in the rural areas also led to low Internet use in Iraq. Hence there is a strong need to analyze the reasons for low rate or non-use of Internet in Iraq.

## Research Question and Objectives

Keeping the above points in consideration, the multinomial logit model has been used in the present study for investigating the factors affecting the use and non-use of the Internet in Iraq with the following objectives.

*First:* To study and analyze the various indicators of Internet usage in Iraq and to identify the reasons preventing the use of Internet, from the user's perspective.

*Second:* To enlist and interpret the demographic characteristics of users and nonusers of Internet in Iraq?

### Research Framework

Various social factors affect the Internet use in Iraq (Figure 1). For example, the family norms, customs and taboos present in the Iraq society would act as limitations for opening Internet cafes for longer duration especially in the night time. Similarly, the elders in Iraq society wouldn't like to have Internet connections at home as they opine that the regulation of Internet utility by their children would be highly difficult. The educational levels, location of the residence and nature of employment also affects the Internet use rate in Iraq. If the educational level is higher i.e. research or academic levels, there is a probability of using Internet at longer and frequent intervals.

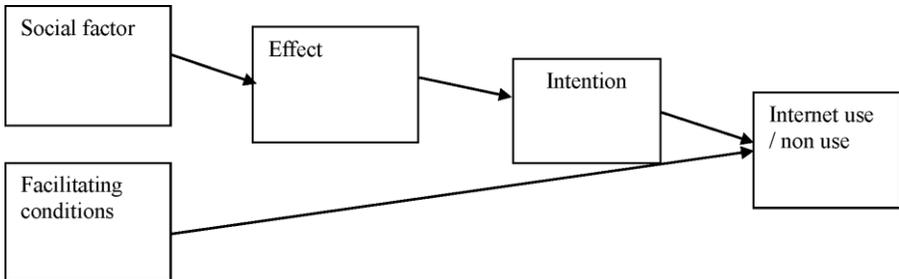


Figure 1. Decision Support Systems for use / non-use of Internet in Iraq. Source:<sup>3</sup>

In case of lower standards of education like primary education, the schools may not use Internet much and the students or children wouldn't generally indulge in Internet browsing at home also. Similarly, in some jobs,

<sup>3</sup> H.C. Triandis, Values, attitudes, and interpersonal behavior, in: M.M. Page, Ed., Nebraska Symposium on Motivation, 1979: Beliefs, Attitudes, and Values, Univ. Nebraska Press, Lincoln, 1980, pp. 195-259

the nature of work requires the use of Internet always compelling the employees to be operative online, where as in case of jobs like transportation, the use of Internet would be minimum leading to limited use or non-use of Internet. Most importantly the place of residence or location play significant role in deciding the extent of use of Internet in Iraq. The rural areas in Iraq in general have less access to Internet connectivity leading to higher rate of non-use of Internet. The facilitating conditions for Internet like higher income level and urban areas and higher level of education would positively influence the extent of Internet use in Iraq by making people interested to use Internet and the intention of people to use Internet would be higher.

Rest of this study is organized as follows. In Section 2 the literature is reviewed with respect to use and non-use of Internet services. The focus is on human development, human capital, testable propositions, consumer law and policy related factors. Section 3 presents the models and methodologies of using Internet and non-using Internet and the underlying data and its management. Section 4 presents the empirical estimation results based on the two internet-use and non-use models. The results from the two models are analyzed in Section 5. Section 6 discusses policy issues in general and factors affecting Internet use in Iraq. Section 7 summarizes and concludes.

## Literature Review

Internet connectivity is one of the most important outcomes of information technology evolved after globalization and liberalization (Dewan and Mendelson, 1998). Coffman and Odlyzko (2007) reported that the high growth rate of the Internet connectivity resulted in an upsurge in research, development, and investment in telecommunications. The Internet is correlated with the emergence and development of new technologies like optical fiber telecommunications. The growth of the Internet affects the growth prospects of other communication services also considerably (Litan and Rivlin, 2001). Lee and Heshmati (2006) studied diffusion of internet, while in Heshmati and Peng (2010) the issues of information and communication technologies policies and practices discussed. Al-Mutavakkil et al. (2009) compute infrastructure indices to rank countries by their level of connectivity. Iraq is ranked among the lowest.

Several factors like technological advancement, human capital, economic scenario, policy related factors, nature of domestic law and status of education and research are significantly related to Internet connectivity rate. The literature related to these important factors of Internet connectivity has been reviewed and future researchable issues were identified.

## **Human Development Index and Human Capital**

The Internet connectivity influences the level of education, literacy and health which in turn affect the human development index in both developed and developing nations (UNDP, 2001a). The effect of human development index (HDI) on Internet connectivity was thoroughly investigated according to the UNDP's Human Development Report; HDI uses information on adult literacy rate, education, Gross Domestic Product, and life expectancy to create an index of countries' level of development which there by influences the Internet connectivity. The influence of Internet connectivity on socio-economic development of any nation was also well illustrated. An illustration, the impact of information and communication technology (ICT) on socio-economic development of Venezuela was reported by UNDP (2001b).

Some studies indicated that the Internet sector is becoming highly competitive than was thought before Giovannetti and Ristuccia (2005). Hence the pricing and maintenance costs of Internet connectivity have become real challenges for the Internet operators across the globe. This also demands the government support in the form of subsidized tariffs. Billon et al. (2009) made a cross-country investigation on study on the determinants of information and communication technology (ICT) diffusion using multivariate analysis techniques to capture the relative and multidimensional character of digital divide. This has revealed that the differences were detected between groups of countries both in terms of ICT patterns and also the factors affecting the ICT. Moreover, in countries registering higher levels of ICT adoption, the digitalization pattern is explained by GDP, service sector, education, and governmental effectiveness. One interesting finding was that in developing countries, population age and urban population are positively associated with the ICT

adoption, while Internet costs impact negatively. In some countries like Iraq, political developments like war affected the human development index negatively as it severely influenced the income pattern of the various sections of the society which reduced the scope for development of infrastructure in general and Internet accessibility in particular (UNDP, 2005). This is because of the fact that during the most favorable conditions existed throughout the world for computerization and Internet spread, Iraq had to face war which severely resulted in destruction of telecommunications.

Kelly and Lewis (2001) examined the determinants of Internet connections in Western Australia and some of the regional and socio-economic differences in Internet adoption. It was revealed that the number of Internet Service Providers (ISPs) is correlated to demographic variables, such as household income and other socioeconomic and regional characteristics which are affected by human capital. The estimates provide information on the major factors affecting household Internet connection and, therefore, provide information on how factors such as economic and demographic change impact Internet usage. An investigation was made on comparison of policy history and the development of cable television in South Korea and Israel (Schejter and Lee, 2007) which suggested that the information technology was highly correlated with the market forces and economy of the nation.

## Policy Related Factors

Policy makers and policy analysts should recognize that institutional change, rather than more competitors of established types, resulted in dramatic improvements in bandwidth growth and prices in USA and such a development could provide a significant additional impetus to aggregate growth and productivity (Galbi, 2000).

Groves and Lempert (2007) and Lempert et al. (2006) developed a new approach to participatory computer-assisted scenario development called as scenario discovery which assisted policy-makers in identifying policy-relevant scenarios. Hence, information technology's growing power offers a potential revolution in new tools and methods to support and improve human decision-making. The Internet connectivity certainly aided

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in better decision support system of the government compared to the traditional system of information.

The security of operating Internet services in any region must be the priority for government policy. If security is ensured through Internet, more people will be interested to operate Internet at their homes and hence the government policy must facilitate this aspect. Roman and Lopez (2009) analyzed the security issues that arise when integrating wireless sensor networks (WSN) and the Internet. They have investigated the possible approaches that can be used to connect a WSN with the Internet, and analyzes the security of their interactions. It was further revealed that through provision of the services of the network through a front-end proxy, a sensor network and the Internet can interact securely which would facilitate higher Internet access.

The strong correlation between the field of agriculture and Internet connectivity and Information and Communication Technologies (ICTs) through facilitating knowledge management was studied by Rao (2006). Based on an evaluation of several ICT initiatives in rural India, a framework to guide policy and implementation of ICTs in Indian agriculture was proposed. In this framework, agricultural development was visualized from two perspectives, rural incomes and livelihoods perspective at the farm level, and a sustainability perspective at the regional level. The implementation of ICTs is proposed in three unique institutional environments: (i) closed vertical supply chain network for agribusiness enterprises, (ii) an open chain network with dynamically evolving partners and supply chain situations for the public, non-governmental and multilateral organizations, and (iii) a spatial data services network to address natural resources management and sustainability concerns. Significant policy, institutional networking and capacity building initiatives will be required at various levels to overcome the constraints and effectively integrate ICTs into the agricultural development process in India. In countries like Iraq, the rigid policies followed by regime of Saddam Hussein affected the Internet accessibility considerably and it was reported that only 25,000 households had Internet accessibility in 2002 which constituted only 0.1% of its total population (Internet World Stats, 2009). Similarly, the war situation also affected the Internet status of Iraq significantly.

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## Nature of Consumer Law

Despite the Internet's increasing importance, there is little social scientific work that addresses its diffusion (Hargittai, 1999). Our knowledge is especially limited with respect to the conditions that encourage its spread across nations. Hence, the differences in Internet connectivity among OECD countries still exist. After examining the impact of economic indicators, human capital, institutional legal environment, and existing technological infrastructure, the empirical analyses show that economic wealth and telecommunications policy are the most salient predictors of a nation's Internet connectivity.

Consumer laws and policies aid in reducing the fraud transactions and ensure fair commercial transactions and hence help in enhancing confidence among the consumers globally (OECD, 1999). The existing laws still have some loop holes in dealing the cases related to cross border transactions in Internet commerce or ecommerce based on which some people have been misusing the laws for their own benefits. This necessitates the modification and regulation of the present legal provisions for a better Internet connectivity.

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people have been misusing the laws for their own benefits. This necessitates the modification and regulation of the present legal provisions for a better Internet connectivity.

## The Models of Non-using and Using Internet

In this study we used the variables “the purpose why people use the Internet” and “reasons why they do not use the Internet” as a dependent variable in the two models used in this study because of the importance to shed lights on these issues. The information can be used in promoting the use and eliminating the barriers to use of Internet.

This variable does not measure the utility of Internet use directly. However because the multinomial logit model is behavioral model, then through this study we could measure the behavior of consumer (Responses), and to know their observed characteristics affecting the Internet use. Yet our study helps to find suitable policy will help in increase Internet diffusion in Iraq.

## Heteroscedasticity

Here we did not apply heteroscedasticity for multinomial logit model, because in parametric discrete choice models, variance functions are not identified in principle because variance functions get divided into the mean function and the ratio  $( \frac{x'\beta}{e^{z_i\gamma}} )$  can be linearly approximated. That is, a “crude” mean function divided by a “crude” variance function cannot be identified from a “detailed”<sup>4</sup> mean function. For this reason, the final result is based on homoscedasticity.

## Model for Non-using Internet in Iraq

The use of Internet in Iraq has not been satisfactory and several factors affect the same. Identification of the factors responsible for non-use of Internet would be useful in developing a strategy for better use of Internet in future. Different factors like gender, age, education, cost, profession and

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<sup>4</sup> Lee, M.L. (2009), “Micro-Econometrics Methods of Moments and Limited Dependent Variables”, Second Edition, Department of Economics, Korea University

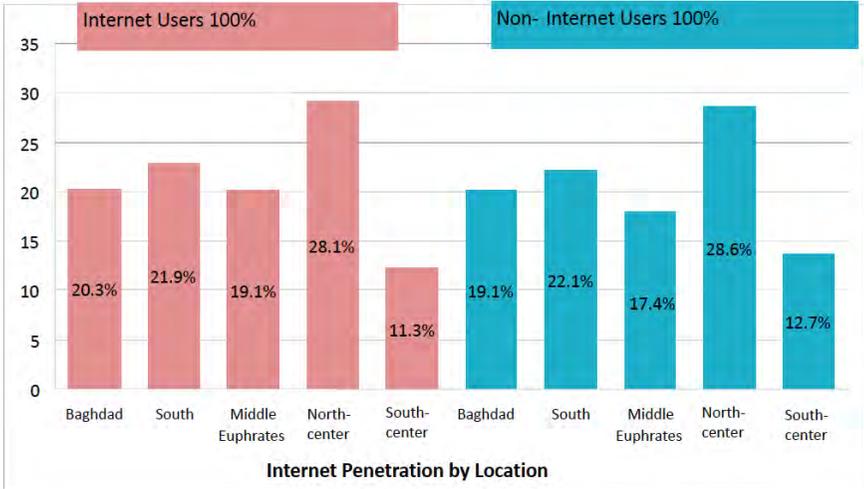
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location influence the use and non-use of Internet. For example, the non-use of Internet was more witnessed in women and in rural areas. Keeping these aspects in consideration, an attempt has been made to collect the appropriate data that represent these factors.

Let us first analyze the approach followed for collection and analysis of the data related to the factors affecting the non-use of Internet.

### **First: Data Collection**

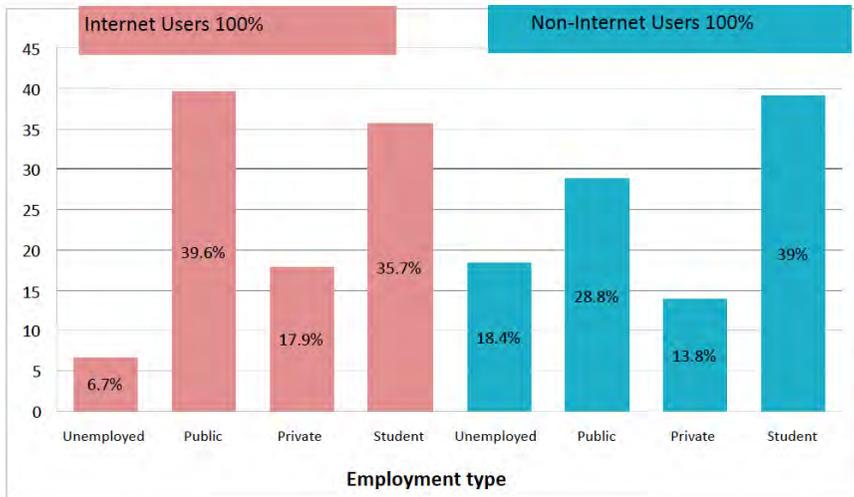
The primary source for the data used in this paper was the Ministry of Foreign Affairs and Ministry of Communication in Iraq who conducted extensive surveys of Iraqi households during April 2009 related to Internet use in Iraq. In total, 15,816 observations (Gender: male 9,439, female 6,396) were collected under this survey, out of which considerable number of households (4,071 respondents, male was 1,792 and Female was 2,269) without Internet connection were noticed as illustrated in Table 3. The data was collected through questionnaire from five regions i.e. Baghdad the capital city, South, South center, North center and finally middle Euphrates (Figure 2) by collecting responses from a random sample of citizens in different ages, gender and level of education. In total, 11 questions were put to the respondents for the data collection. Data collected in April 2009 on Internet use in Iraq, total observations 15,816, no missing observations, Cities have been surveyed in stratified form by their populations share as shown in Figure 2.



**Figure 2:** Iraqi random sample observations by provincial location

The stratified sample was collected based on a population registry under the oil for food program of United Nations in 1996 in Iraq. Under this program, UN has made a population census in Iraq and every household had a number (coupon to be used each month to get their share of food). Moreover, UN updated this information on census on regular basis and hence our data collection can be considered as more accurate without giving any scope for the bias.

For a better understanding of the variables we provide a description of some of these variables. For instance the variable Age has been categorized into three group ages (12-25, 25-40, and +40 years). Same rule has been applied to Employment variable which is categorized into four different groups of Employment nature (unemployment, public employee, private employee, and the last group is for the student) (see Figure 3).



**Figure 3:** Internet use (non-use) by Employment group

The descriptions of the main factors are in details shown in Table 1.

Variable	Description
Gender	0 for male and 1 for female
Age1	Less than 12 to 25, By years
Age2	25 to 40, By years
Age3	More than 40, By years
Education1	Primary and intermediate
Education2	High school and diploma
Education3	BSc
Education4	High diploma, MSC and PhD
Employment1	Unemployed
Employment2	Public
Employment3	Private

Employment <sub>4</sub>	Student
Internet	o if he has Internet and 1 do not have Internet
Location <sub>1</sub>	Baghdad
Location <sub>2</sub>	South of Iraq
Location <sub>3</sub>	Region of south-central Iraq
Location <sub>4</sub>	Region of north-central Iraq
Location <sub>5</sub>	Middle Euphrates region
No-Internet <sub>1</sub>	Do not know how to use
No-Internet <sub>2</sub>	Not available
No-Internet <sub>3</sub>	Economic reasons
No-Internet <sub>4</sub>	No answer
Purpos <sub>1</sub>	General search
Purpos <sub>2</sub>	Special purpose
Purpos <sub>3</sub>	Entertainment and Mail and chatting
Purpos <sub>4</sub>	No answer
Modes <sub>1</sub>	Dialup
Modes <sub>2</sub>	Broadband
Modes <sub>3</sub>	Internet cafe
Modes <sub>4</sub>	More than one way
Intensity <sub>1</sub>	Not at all
Intensity <sub>2</sub>	Rarely or sometimes
Intensity <sub>3</sub>	Mostly
Intensity <sub>4</sub>	Always online

**Table 1:** Description of the main variables

## Second: Descriptive Statistics

In the survey performed in this study, it has been seen that non-Internet users are those who never use Internet services. Different reasons are given as explanation to their distanced behavior. Do not know how to use and lack of access are key factors here leading to non-use of Internet. When non-users were asked to identify the greatest barrier that keeps them away from using the Internet, Do not know how to use was the first most often (illiteracy in using this technology) cited barrier with more than 43.7 percent of male and 47.3 percent of female of the sample. Lack of access to the Internet was the second cited barrier with more than 35.5 percent of male and 26.6 percent of female. Cost came third with more than 17 percent for male and 21.7 percent for female. The majority of non-Internet user came from age (less than 12 to 25 category) for male 67.3 percent and 58.3 percent for female, for education the majority of non-Internet user came from (High school and diploma category) for male 50 percent and for female 45 percent, while for employed the majority of non-Internet user came from (student category) 50 percent for male and 30.5 percent for female. Summary of non-users are reported in Table 2.

No Internet Female		No Internet Male	
Gender			
Female	2279	Male	1792
Age %			
Less than 12 to 25	(67.3)	Less than 12 to 25	(58.3)
25 to 40	(23.3)	25 to 40	( 28.4)
More than 40	(9.4)	More than 40	(13.3)

Education %			
Primarily and intermediate	(32.4)	Primarily and intermediate	(34.7)
High school and diploma	(49.9)	High school and diploma	(44.8)
BSc	(15.7)	BSc	( 17.3)
High diploma, MSC and PhD	(20)	High diploma, MSC and PhD	(3.2 )
Employment %			
Unemployed	(19)	Unemployed	(17.7)
Public	(28.2)	Public	( 29.4 )
Private	(7)	Private	(22.4)
Student	(45.8)	Student	(30.5)
Reason for not using Internet %			
Do not know how to use	(43.7)	Do not know how to use	(47.3)
Not available	(35.5)	Not available	(26.6)
economic reasons	(17)	economic reasons	(21.7)
No answer	(3.9)	No answer	(4.5)
Location %			
Baghdad	(24.6)	Baghdad	(14.3)
Southern Iraq	(20.6)	Southern Iraq	(23.9)

North-central of Iraq	(24.7)	North-central of Iraq	( 28.8 )
South-central of Iraq	(14.2)	South-central of Iraq	(12.8 )
Middle Euphrates	(15.9)	Middle Euphrates	(20.2 )

**Table 2:** Frequency distribution of no Internet use in Iraq by different characteristics

**Third: Methodology, specification and estimation**

As the non-use of Internet in Iraq is influenced by various types of factors or reasons, the model development was done after thorough investigation of parametric and nonparametric methods and descriptive and factor analyses. Similarly, a multiple logistic regression analysis model has also been developed for determining the actual factors affecting the non-use of Internet in Iraq.

**Methodology**

The multinomial logit model has been employed here to assess the reasons for not using Internet in Iraq through individual sample collection at different places. It was mainly used to get parametric and discrete choice options in estimating the response of the people in analyzing the reasons for non-use of Internet in Iraq. In this study we utilize a parametric approach to estimate a model of Internet use. As the reasons for non-use of Internet are many, preferences of the respondents among the best alternatives for non-use of Internet were exercised for utility maximization and the following model has been developed:

$$1) \quad U(\text{alternative } J) = \beta_j' X_{ij} + \varepsilon_{ij}$$

where i: index for the observation or individual, j: index for the choices, X: vector of explanatory or conditional variables or indicators of Internet

access,  $\beta$ : the vectors of unknown parameters to be estimated and  $\varepsilon$ : random error term.

The alternative (Utility) for  $U_i$  is preferred if  $U_i$  (alternative  $j$ ) is greater than  $U_i$  (alternative  $k$ ) which can be written as follows:

$$2) \quad \text{Observed } Y_i = \text{choice } j \text{ if } U_i(\text{alternative } j) > U_i(\text{alternative } k) \quad \forall k \neq j$$

The independent variables in this model include a set of individual specific characteristics, such as education, gender, age, employment, etc. which can be regarded as similar for the choices. The individual can exercise her choice among these alternatives based on her judgment on preferred characteristics of the choices which ultimately determines the probable choice. For example, the probability of having  $j$  as choice by an individual is possible under circumstances when alternative  $j$  is more preferred than another alternative  $k$  based on the specific characteristics analyzed by the individual. Hence the choice of probability for  $j$  can be written as follows:

$$3) \quad \text{Pr ob}[\text{choice } j] = \text{Pr ob}[U_j > U_k], \forall k \neq j$$

It also implies that the probability of selecting choice  $j$  will be considered as same if the probability of the utility of rank  $j$  is selected when it is superior to utility rank  $k$ , provided that the utilities for  $j$  and  $k$  are not equal.

## Specification

By employing the above theoretical considerations and after analysis of the responses collected from different people of Iraq related to the non-use of Internet, various indicators of non-use of the Internet have been applied to the model below (equation 4). We specify a model to identify the determinants of Internet use and to estimate each impact on the probability of reason for not having Internet. The model is specified as:

$$4) \quad Y_i = f(X_{1i}, X_{2i}, \dots, X_{ji})$$

where  $X_j$  are  $J$  indicators or vectors of indicators of not using Internet. The indicators here are age, education level, employment, gender, intensity, and location. After appending an error term the model specification is as follows:

$$5) \quad Y_i = \alpha_0 + \beta_{Gen} Gen_i + \sum_{j=1} \beta_j Age_{ji} + \sum_{j=1} \beta_j Edu_{ji} + \sum_{j=1} \beta_j Emp_{ji} + \sum_{j=1} \beta_j Ins_{ji} + \sum_{j=1} \beta_j Loc_{ji} + \varepsilon_i$$

where Edu, Emp, Ins and Loc represent education level, employment nature, intensity rate and regional location of users. The number of categories in each group of variables ( $J$ ) may differ by the way the variable category is defined.

### Estimation

It is now implied that the single econometric equation cannot explain the combined and interrelated effect of several factors affecting the non-use of Internet in Iraq. Hence, binomial logit model will not be suitable for this context and hence multinomial logit model has been developed for its use in discrete choice analysis as follows:

$$6) \quad Prob[choice \ j] = \frac{\exp(\beta'_j X_t)}{\sum_{m=1}^J \exp(\beta'_m X_t)}, J = 0, \dots, J,$$

where  $Y_j$  represents the probability for choice  $j$ , i.e. observed outcome,  $\beta$  represents the parameters to be estimated, and  $X$  represent variables influencing the non-use of the Internet.

### Model for Using Internet in Iraq

Several factors influence the use of Internet in Iraq. Identification of the factors responsible for use of Internet would be useful in developing a strategy for better use of Internet in future. Different factors like gender,

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age, cost, education, profession and location influence the use and non-use of Internet. For example, the use of Internet was more witnessed in men and in urban areas. Keeping these aspects in consideration, an attempt has been made to collect the appropriate data that represent these factors.

Let us first analyze the approach followed for collection and analysis of the data related to the factors affecting the use of Internet.

### **First: Data Collection**

As mentioned previously, the primary source for the data used in this paper was the Ministry of Foreign Affairs and Ministry of Communication in Iraq who made an extensive survey of Iraqi households during April 2009 related to Internet use in Iraq. This was explained in the section of data collection for non-use of Internet.

### **Second: Descriptive Statistics**

In the survey performed in this study, it has been seen that Baghdad recorded highest number of Internet users (29 percent) compared to other locations of Iraq. Similarly, males have used Internet most frequently than females. General search is the prime reason for using the Internet in Iraq and students use most frequently and the people with age group of 12-25 use the Internet most frequently. Iraqis access the Internet through identifiable procedures. In the survey, it has been seen that there are those who use dial-up connections while others use wireless access. Dialup users reached 10 percent while these who used wireless connection approached 67 percent. The dial-up is connection to Internet is using phone. The majority of users are those who use Internet wireless connection either through Internet cafes or through the delivery line from the nearest Internet cafe to the house for 67 percent. In fact, Internet café are convenient, cheap and an easy way to access the Internet for users with low time use demand. The purpose of use varied among the Internet. A total of 56 percent spend time for general search and 19 percent for entertainment, email and chatting, and another 23 percent of Internet user for special purposes. To understand the data further, the following Table 4.6 shall present the said statistics (Table 3).

Internet Female		Internet Male	
Gender			
Female	4126	Male	7637
Age %			
Less than 12 to 25	(59.9)	Less than 12 to 25	(54.4)
25 to 40	(33.1)	25 to 40	(36.7)
More than 40	(7.0)	More than 40	(7.9)
Education%			
Primarily and intermediate	(12.7)	Primarily and intermediate	(12.4)
High school and diploma	(43.6)	High school and diploma	(46.9)
BSc	(31.4)	BSc	(28.6)
High diploma, MSC and PhD	(12.6)	High diploma, MSC and PhD	(12)
Employment %			
Unemployed	(6.5)	Unemployed	(6.7)
Public	(37.7)	Public	(40.7)
Private	(14.3)	Private	(19.9)
Student	(41.5)	Student	(32.6)
Purpose for use of Internet %			
General search	(54.1)	General search	(58.3)
Special purpose	(26.8)	Special purpose	(21.4)
Entertainment Mail and chatting	(18)	Entertainment Mail and chatting	(19.7)
No answer	(1.1)	No answer	(1.1)
Modes %			
Dialup	(12.4)	Dialup	(9.4)
Broadband	(15.8)	Broadband	(8.7)

Internet cafe	(69.8)	Internet cafe	(79.3)
More than one way	(1.1)	More than one way	(1.6)
No answer	(0.9)	No answer	(0.9)
Intensity rate %			
Not at all	(0.8)	Not at all	(1.1)
Rarely or sometimes	(45.6)	Rarely or sometimes	(45.4)
Mostly	(29.8)	Mostly	(31.6)
Always online	(23.5)	Always online	(21.9)
Location %			
Baghdad	(28.9)	Baghdad	(15.7)
Southern Iraq	(18.8)	Southern Iraq	(25.1)
North-central of Iraq	(22.3)	North-central of Iraq	(27)
South-central of Iraq	(13.4)	South-central of Iraq	(11.7)
Middle Euphrates	(16.7)	Middle Euphrates	(20.5)

### Third: Specification and estimation

As the use of Internet in Iraq is influenced by various types of factors or reasons, the model development was done after thorough investigation of parametric and non-parametric methods and descriptive and factor analyses. Similarly, a multiple logistic regression analysis model has also been developed for determining the actual factors affecting the usage of Internet in Iraq.

### Specification:

Based on the same methodology and findings in the literature, we specify a model to identify the determinants of Internet use and to estimate each impact on the probability of no connection. The model is specified as:

$$4) \quad Y_i = f(X_{1i}, X_{2i}, \dots, X_{Ji})$$

where  $X_j$  are  $J$  indicators or vectors of indicators of purpose for using Internet. The indicators here are age, education level, employment, gender, Intensity, and, location as well. After appending an error term the model specification is as follows:

$$5) \quad Y_i = \alpha_0 + \beta_{Gen} Gen_i + \sum_{j=1} \beta_j Age_{ji} + \sum_{j=1} \beta_j Edu_{ji} + \sum_{j=1} \beta_j Emp_{ji} + \sum_{j=1} \beta_j Ins_{ji} + \sum_{j=1} \beta_j Loc_{ji} + \varepsilon_i$$

where Edu, Emp, Ins and Loc represent education level, employment, Intensity rate and regional location of users. The number of categories in each group of variables ( $J$ ) may differ by the way the variable category is defined.

Researchers commonly use the multinomial logit model in discrete choice analysis. However The Internet diffusion cannot be captured through a single econometric equation. After examining by using a multinomial logit model which is an extension of the basic binomial logit model to estimate the unknown parameters  $\beta_j$  and define the factors that influence Internet use in Iraq. However, since the dependent variable is not a continuous variable, we are not able to use ordinary least squares (OLS) estimation method. Accordingly, the model is written as:

$$6) \quad \text{Pr ob}[choice j] = \frac{\exp(\beta'_j X_t)}{\sum_{m=1}^J \exp(\beta'_m X_t)}, J = 0, \dots, J,$$

where  $\beta$  represents the parameters that are estimated, while all  $X$  represent variables influencing the decisions to adopt access to the Internet. (Note that, for the  $i$  individual,  $Y_i$  is the observed outcome and  $X_i$  is a vector of explanatory variables).

Table 4 represents the summary results of the Multinomial logit analysis for our model in equation (5).

Variable	Probability (y=1) "Do not know how to use"		Probability (y=2) "Not available"		Probability (y=3) "Economic"	
	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics
Constant	3.659***	25.584	1.804***	13.242	1.703***	12.399
Gender (Male=1)	-0.210***	-3.419	-0.233***	-5.116	0.084***	1.741
Age2	0.075	0.926	0.270***	4.805	0.188***	3.148
Age3	0.433***	3.795	-0.185	-1.903	0.147	1.535
Education2	-0.974***	-12.921	-0.131**	-1.915	-0.115	-1.660
Education3	-1.463***	-14.631	-0.192**	-2.424	-0.076	-0.958
Education4	-1.019***	-7.283	0.150	1.501	-0.104	-0.983
Employment2	-0.498***	-4.803	-0.049	-0.542	-0.553***	-6.060
Employment3	-0.301***	-2.618	0.368***	3.804	-0.011	-0.124
Employment4	-0.429***	-4.381	0.119	1.336	-0.054	-0.626
Intinsty2	-3.812***	-36.955	-2.480***	-24.852	-2.363***	-22.663
Intensity3	-5.263***	-37.781	-3.183***	-30.111	-2.663***	-24.565
Intinsty4	-5.356***	-34.965	-3.388***	-30.579	-2.791***	-24.847
Location2	-0.130	-1.447	-0.040	-0.606	-0.303***	-4.239
Location3	-0.199	-2.054	0.112	1.598	-0.444	-0.609
Location4	-0.107	-1.217	-0.003	-0.046	-0.095	-1.412
Location5	-0.166	-1.577	-0.072	-0.902	0.025	-0.312
RHO ( $\rho$ )=	0.148					
LR test	5,979					
Critical value	$\chi^2(nn, p=0.05)=26.30$					

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## Empirical Analysis for Non-use of Internet Model

Due to the use of maximum likelihood techniques, an R-square measure does not exist for the logit model. However, a chi-square test statistics may be used to measure the significance of models fit.

### Variable Specification

Keeping the above views in consideration, different types of variables were included in the Internet service model. The factors affecting non-use of Internet in Iraq like individual socio-demographics, intensity, locations and employment characteristics were considered under this model. The factors like gender, age and educations status were considered under socio-demographic variables. Similarly, employment variables included under the present study were unemployed, public, private and student. The intensity variables included four categories i.e. not at all, rarely or sometimes, mostly and always online. Lastly, four location variables included were Baghdad, south of Iraq, region of south-central Iraq, middle Euphrates region and region of north-central Iraq.

### Empirical Results

In this section we discuss the variable effects. According to the result illustrated in the Table 4 the model with the highest RHO ( $\rho=0.148$ ) indicates the best fitted model with data (McFadden (1974)<sup>5</sup>, furthermore, LR test (LR=5,979) and its critical values ( $p=0.05$ )=26.30)<sup>6</sup> indicate that the effect of the model specification is statistically significant (Greene, 2008). In more detail, the calculated LR value in this model was larger than the critical value in 5% level of significance, which indicates that the null hypothesis (the model with only intercept) is rejected and the explanatory variables used in the model are all jointly significant.

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<sup>5</sup>  $RHO = 1 - LL_1 / LL_0$  where  $LL_1$  = Unrestricted log likelihood and  $LL_0$  = Restricted log likelihood functions.

<sup>6</sup>  $LR = 2(LL_1 - LL_0)$  - where  $LL_1$  = Unrestricted log likelihood, and  $LL_0$  = Restricted log likelihood functions.

However the coefficient values of multinomial logit regression discrete choice model for all the three probabilities ( $y=1$ ,  $y=2$  and  $y=3$ ) are presented in Table 4. The constant variable and all the 16 variables were included in this model. The second column (probability of  $y=1$  which means that the reason for not have Internet is “Don’t know how to use it”), reflects the effect of coefficient estimates for multinomial logit of reasons for not using Internet when the probability  $y=1$ . The variables like location<sub>1</sub>, location<sub>2</sub> and location<sub>3</sub> represented coefficients which are negative and statistically insignificant which reflects that the non-use of Internet was not affected much by the locations in Iraq. When probability  $y=1$ , the superior coefficient value was recorded with constant variable (3.659) followed by Age<sub>3</sub> (More than 40 years category) (0.433) which was also found to be significant statistically (see Table 4). It also implies that the older people don’t use Internet much relative to the young people. It was also noticed that the variables like gender, education<sub>2</sub>, education<sub>3</sub>, education<sub>4</sub>, employment<sub>2</sub>, employment<sub>3</sub>, employment<sub>4</sub>, intensity<sub>2</sub>, intensity<sub>3</sub> and intensity<sub>4</sub> resulted in negative coefficient values with statistical significance. Moreover, the variables like gender, intensity<sub>2</sub>, intensity<sub>3</sub> and intensity<sub>4</sub> displayed statistically significant coefficient values even when probability  $y=2$  or  $y=3$ . In case of education, the positive correlation was resulted as the higher level of education in general encouraged the access and use of Internet.

### Marginal Effects of Characteristics Category

The values of the coefficient and probability have been presented in Table 5 under marginal effects of multinomial logistic regression, as the direct interpretation of the parameter estimates reported in first, second and third column of Table 4 is not possible given the logit transformation of the outcome (dependent variable) required for model estimation. We, therefore, provide alternative method, which is marginal affect. As can be shown in Table 5 the change in independent variables like age, gender, education, employment and location influenced the dependent variable i.e. Internet non-use significantly which is well reflected through marginal effects. The negative value of coefficient (when probability  $y=1$ ) i.e. -0.013 for male denotes that the female uses Internet less than male when the reason is “Do not know how to use”; in other word this means that the proportion

of illiteracy in the use of Internet is higher for female group compared to male group, similarly, when probability  $y=2$  or  $y=3$ .

Variable	Probability (y=1) "Do not know how to use"		Probability (y=2) "Not available"		Probability (y=3) "Economic reasons"	
	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics
Constant	3.659***	25.584	1.804***	13.242	1.703***	12.399
Gender (Male=1)	-0.210***	-3.419	-0.233***	-5.116	0.084***	1.741
Age2	0.075	0.926	0.270***	4.805	0.188***	3.148
Age3	0.433***	3.795	-0.185	-1.903	0.147	1.535
Education2	-0.974***	-12.921	-0.131**	-1.915	-0.115	-1.660
Education3	-1.463***	-14.631	-0.192**	-2.424	-0.076	-0.958
Education4	-1.019***	-7.283	0.150	1.501	-0.104	-0.983
Employment <sub>t2</sub>	-0.498***	-4.803	-0.049	-0.542	-0.553***	-6.060
Employment <sub>t3</sub>	-0.301***	-2.618	0.368***	3.804	-0.011	-0.124
Employment <sub>t4</sub>	-0.429***	-4.381	0.119	1.336	-0.054	-0.626
Intensity2	-3.812***	-36.955	-2.480***	-24.852	-2.363***	-22.663
Intensity3	-5.263***	-37.781	-3.183***	-30.111	-2.663***	-24.565
Intensity4	-5.356***	-34.965	-3.388***	-30.579	-2.791***	-24.847
Location2	-0.130	-1.447	-0.040	-0.606	-0.303***	-4.239
Location3	-0.199	-2.054	0.112	1.598	-0.444	-0.609
Location4	-0.107	-1.217	-0.003	-0.046	-0.095	-1.412
Location5	-0.166	-1.577	-0.072	-0.902	0.025	-0.312
RHO (ρ)=	0.148					
LR test	5,979					
Critical value	$\chi^2(nn, p=0.05)=26.30$					

Similarly, Age<sub>3</sub> recorded coefficient value of 0.037 which reflects that the increase of Age<sub>3</sub> by 1 unit results in increase in non-use of Internet by 0.037 times relative to Age<sub>1</sub> (treated as the base category) when the probability  $y=1$ . All other independent variables like educations (Education<sub>2</sub>, Education<sub>3</sub> and Education<sub>4</sub>), employments (Employment<sub>2</sub>, Employment<sub>3</sub> and Employment<sub>4</sub>) and location<sub>3</sub> (Southern Iraq) registered negative values of coefficients indicating the inverse relation with the non-use of Internet in Iraq, when the probability  $y=1$  (do not know how to use).

But when the probability  $y=2$  (not available), Age<sub>2</sub> recorded coefficient value of 0.039 which reflects that the increase of Age<sub>2</sub> by 1 unit results in increase in non-use of Internet by 0.039 time relative to Age<sub>1</sub>, Age<sub>3</sub> recorded coefficient value of -0.055 which reflects that the increase of Age<sub>3</sub> by 1 unit results in decrease in non-use of Internet by 0.055 relative to Age<sub>1</sub> (base category), Education<sub>2</sub> and Education<sub>4</sub> resulted in positive values of coefficient equal 0.056 and 0.060 respectively, which reflect that the increase of Education<sub>2</sub> or Education<sub>4</sub> by 1 unit results in increase in non-use of Internet by 0.056 or 0.060 times relative to Education<sub>1</sub> (base category). The positive value of coefficient of Employment<sub>2</sub>, Employment<sub>3</sub> and Employment<sub>4</sub> equal 0.034, 0.079 and 0.036 which reflects that the increase of Employment<sub>2</sub>, Employment<sub>3</sub> and Employment<sub>4</sub> by 1 unit results in increase in non-use Internet by 0.034, 0.079 and 0.036 times relative to Employment<sub>1</sub> (base category). All intensity rate categories (intensity<sub>1</sub>, intensity<sub>2</sub> and intensity<sub>3</sub>) have negative value of coefficients indicating the inverse relation with the non-use of Internet, location<sub>3</sub> (Southern Iraq) recorded coefficient value of 0.029 which reflects that the increase of locant<sub>3</sub> by 1 unit results in increase in non-use of Internet by 0.029 time relative to locant<sub>1</sub> (Baghdad as base category).

For the probability  $y=3$ , (economic reason), public sector employee has higher negative marginal effect on non-use of Internet. Some explanatory variables are found to be statistically significant and negative impact at the 0.01 level which is Employment<sub>2</sub>, intensity<sub>2</sub>, intensity<sub>3</sub>, intensity<sub>4</sub> and location<sub>2</sub>, they record value of coefficient -0.083, -0.018, -0.166, -0.174 and -0.047 successively, denotes that relative to the Employment<sub>1</sub> (Unemployed "Base Group") Employment<sub>2</sub>, has lower probability of non-use Internet ( $y=3$ ), relative to the intensity<sub>1</sub> (not at all "base category") intensity<sub>2</sub>, intensity<sub>3</sub> and intensity<sub>4</sub> have lower probability of non-use Internet ( $y=3$ ) and relative to the location<sub>1</sub> (Baghdad "base category"), location<sub>2</sub> has lower probability of non-use Internet ( $y=3$ ). Only one factor, Education<sub>3</sub> found to be statistically significant at the 0.05 level, 0.028, denotes that relative to Education<sub>1</sub> (Primary and intermediate "Base category"), Education<sub>3</sub> has higher probability of non-use Internet ( $y=3$ ).

## Empirical Analysis for Use of Internet Model

### Variable Specification

Similar to the model used for non-use of Internet, different types of variables were included in the Internet use model like gender, age, intensity, education, locations and employment characteristics. The employment variables included under the present study were unemployed, public, private and student. The intensity variables included four categories i.e. not at all, rarely or sometimes, mostly and always online. Lastly, four location variables included were Baghdad, south, south-central, middle Euphrates and north-central region.

### Empirical Results

In this section, we discuss the variable effects. Again according to the result illustrated in the Table 6 the model with the highest RHO ( $\rho=0.216$ ) indicates a best fitted with data. The LR test equal ( $LR=8,576.82$ ) and its critical values ( $p=0.05$ )= $26.30$  indicate that the effect of the model specification is statistically significant. The test result indicates that the null hypothesis (the model with only intercept) is rejected and the explanatory variables used in the model are all jointly significantly different from zero.

Table 6. Maximum likelihood logit model parameter estimates of reasons for using Internet; probabilities

Variable	Probability (y=1) "General search"		Probability (y=2) "Special purpose"		Probability (y=3) "Entertainment Mail and chatting"	
	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics
Constant	-1.495***	-11.325	-3.966***	-20.893	-2.088***	-13.870
Gender ( male=1)	0.083	1.134	-0.205***	-2.528	0.185**	2.293
Age2	-0.246**	-2.536	-0.248**	-2.342	-0.182	-1.710
Age3	-0.260	-1.992	-0.403***	-2.703	-0.442***	-2.840

Education2	-0.085	-1.001	0.393***	3.632	-0.626***	-6.654
Education3	0.236	2.033	0.747***	5.462	-0.688***	-5.377
Education4	0.585***	2.914	2.162***	10.117	-0.442	-1.982
Employment2	0.236	2.027	0.678***	4.453	-0.480***	-3.688
Employment3	0.040	0.302	0.891***	5.368	-0.097	-0.680
Employment4	0.855***	7.762	1.616***	11.018	0.630***	5.243
Intensity2	4.194***	44.230	4.806***	37.860	4.663***	40.375
Intensity 3	5.191***	30.217	5.854***	30.498	5.452***	29.190
Intensity4	5.516***	24.785	5.950***	24.857	5.618***	23.817
Location2	0.111	1.032	0.126	1.057	0.201	1.680
Location3	-0.094	-0.830	-0.176	-1.399	-0.144	-1.137
Location4	-0.174	-1.667	-0.215	-1.862	-0.092	-0.790
Location5	-0.287**	-2.314	-0.331**	-2.403	-0.125	-0.910
RHO (ρ)=	0.216					
LR	8576.82					
Critical value	$\chi^2(n, p=0.05)=26.30$					

\*\*\*Denotes statistical significance at the 1% level (two-sided test).

\*\*Denotes statistical significance at the 5% level (two-sided test).

The coefficient values of multinomial logit regression discrete choice model for all the three probabilities ( $y=1$ ,  $y=2$  and  $y=3$ ) are presented in column2, column3 and column4 respectively in Table 6. The effect of coefficient estimates for multinomial logit of reasons for using Internet for all the three probabilities ( $y=1$  use Internet for general search;  $y=2$  use Internet for special purpose; and  $y=3$  use Internet for entertainment, mail and chatting) and the constant variable and all the 16 variables were included in this model. The variables like location2, location3 location4 and location5 represented

coefficients which are negative and insignificant which reflects that the use of Internet was not affected much by the locations in Iraq.

### Marginal Effects of Characteristics Category

A direct interpretation of the parameter estimates reported in first, second and third column of Table 6 is not possible given the logit transformation of the outcome variable required for model estimation. We, therefore, provide alternative method which is marginal affect. As can be shown in Table 7, the variation in independent variables like age, gender, education, employment and location influenced the dependent variable i.e. Internet use significantly which is well reflected through marginal effects. The value of coefficient (when probability  $y=1$ ) i.e. 0.023 for male implies that the increase in 1 male increases the use of Internet by 0.023 times compared to the female group. Similarly, when probability  $y=3$ , the increase in 1 male will result in increase in Internet use by 0.025 times relative to female. However, it has inverse relation with Internet use when probability  $y=2$ . Similarly, Age 3 recorded coefficient value of 0.030 which implies that the increase of Age3 by 1 unit results in increase in use of Internet by 0.030 times relative to Age1 (as base category),

**Table 7:** Values of the coefficient Marginal effects and probability for use of Internet

Variable's name	y=1 "General search".		y=2 "Special purpose"		y=3 "Entertainment Mail and chatting"	
	Coefficient	t-statistics	Coefficient	t-statistics	Coefficient	t-statistics
Constant	0.307***	13.035	-0.374***	-18.140	-0.012	-0.743
Gender (male)	0.023***	2.707	-0.048***	-7.016	0.025***	3.722
Age2	-0.012	-1.120	-0.004	-0.531	0.007	0.892
Age3	0.030***	1.642	-0.019	-1.292	-0.023	-1.497
Education2	0.001	0.131	0.091***	7.781	-0.097***	-11.392
Education3	0.046***	3.158	0.113***	8.688	-0.154***	-14.283
Education4	-0.054***	-2.698	0.285***	18.924	-0.204***	-11.867
Employment2	0.032	1.797	0.095***	5.605	-0.120***	-9.706
Employment3	-0.080***	-4.235	0.137***	7.788	-0.050***	-3.880
Employment4	-0.042**	-2.433	0.132***	7.939	-0.054***	-4.737
Intensity2	-0.022	-1.297	0.110***	7.309	0.078***	6.274
Intensity3	0.016	0.902	0.132***	8.604	0.052***	3.851
Intensity4	0.067***	3.477	0.105***	6.492	0.040***	2.704

Location2	-0.008	-0.683	-0.001	-0.009	0.0136	1.332
Location3	0.012	0.927	-0.011	-1.110	-0.005	-0.480
Location4	0.008	-0.669	-0.010	-1.089	0.012	1.242
Location5	-0.019	-1.281	-0.014	-1.247	0.023	1.013

\*\*\*Denotes statistical significance at the 1% level (two-sided test).

\*\*Denotes statistical significance at the 5% level (two-sided test)

Similarly, Education2 has significant positive effect on having Internet ( $y=2$ ) it registered 0.091 times higher probability relative to Education1 (base category) Education3 has significant positive effect on Internet use in Iraq. It registered a coefficient value of 0.046 ( $y=1$ ) i.e. increase in Education3 by 1 unit results in increase in Internet rate by 0.046 times. Relative to Education1, similarly the coefficient value of Education3 ( $y=2$ ) it registered 0.013 i.e. increase in Education3 by 1 unit results in increase in Internet rate by 0.013 times higher probability relative to Education1, but coefficient of Education3 is -0.153 ( $y=3$ ) i.e. increase in Education3 by 1 unit results in decrease in Internet rate by 0.153 times lower probability relative to Education1. The logistic regressions coefficient of Education4 is -0.054 ( $y=1$ ) and -0.204 ( $y=3$ ) respectively, relative to the Education1 (Primary and intermediate “Base Group”) indicating Education4 have 0.054 and 0.204 lower probability of Having Internet successively. But when the probability  $y=2$  is considered, the logistic regressions coefficient of Education4 is 0.285 relative to the Education1, Education4 has higher probability of having Internet.

The logistic regressions coefficient of Employment2 (public employee), is 0.095 relative to the Employment1 (base group), Employment2 has 0.095 higher probability of having Internet ( $y=2$ ) but has 0.120 lower probability of having Internet when ( $y=3$ ). The logistic regressions coefficient of Employment3 (student) are -0.080 and -0.050 when the probability is  $y=1$  and  $y=3$  respectively relative to the Employment1, Employment3 has 0.080 and 0.050 lower probability of having Internet, but Employment3 has 0.137 higher probability relative to Employment1 when the probability  $y=2$ . Intensity2, Intensity3 and Intensity4 also registered positive values of coefficient and hence they influence the Internet use in Iraq significantly and higher relative to Intensity1 (base category).

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## Policy and Factors Affecting Internet Access

### General Policy Issues

As the present study revealed that the factors like age, geographical location, gender, education and literacy and employment affected the Internet connectivity in Iraq, the government of Iraq must come up with future policies addressing these factors. The government must make efforts to incorporate poverty eradication programs and literacy mission in the future policy guidelines so that the Internet access would be positively influenced. Though some strong initiatives were taken by the Iraqi government for development of telecommunication sector, the Internet connectivity was hardly hit due to the involvement of Iraq in War. Iraq Communications and Media Commission (ICMC) were established in 2004 to promote the telecommunications, to attract more investments and to discourage excessive state interference in the market.

### Indicators of ICT Technologies and e-governance in Iraq

Though the security levels are low, Iraq could succeed in developing ICT technology specifically with respect to telecommunications (ESCWA, 2007a). However, Iraq could not make use of ICT technology that aids in innovation, incubation and venture capital investment till now and encouraging Internet connectivity would certainly boost the prospects of ICT technology in this direction (ESCWA, 2007b). The efficient administration in Iraq would require the successful implementation of ICT technology and e-governance mechanism which is further dependent on Internet connectivity. e-governance also facilitates better governance, transparency, accountability and more cost effective utilization of government budget (USAID, 2005). Boost to the telecommunication policy in Iraq would be facilitated by encouraging the foreign direct investments in telecommunication sectors and by having new initiatives for better multilateral international linkages. All the demographic characteristics identified in this paper may be addressed in the future policy making so that the telecommunication sector in general and Internet development in particular would gain strong momentum.

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### **Income a significant factor of Internet Use**

As mentioned in the multinomial logit model, several factors like age, gender, location, employment and location affected the use and non-use of Internet in Iraq. In addition, one most important factor that influences the use and non-use of Internet in Iraq is the level of income of the people. If the income level is poor, the people will not have ability to pay for the Internet connectivity and hence results in higher levels of non-use of Internet. The war in Iraq affected its economic condition miserably making the standard of living of its people very poor. The oil for food program helped in provision of basic income and subsidies to the Iraq people (UNDP, 2005). Hence, many after meeting their basic needs don't have convenience to pay for the Internet connectivity resulting in poor use of Internet. The Gini coefficient of Iraq was found to be increased from 0.36 in 2003 to 0.42 in 2004 which represents the income inequality among different households of Iraq.

### **Other Characteristics affecting Internet in Iraq**

People with high diploma, M.Sc. and PhD were found to be quite familiar with the use of the Internet compared to people with lesser levels of education. This might be due to the demand of computers and Internet with the increase in level of education. In general, the people pursuing M.Sc. and PhD require more analytical and review of research work that certainly requires the use of Internet to have the access to the online journals. At the same time, the students recorded highest use of Internet due to their maximum demand for searching the information related to their academic courses. Moreover, students also have highest level of enthusiasm in interacting with others in several fields under several locations that necessitates them to use the Internet frequently. PhD and several employees in beginning of the career who are eager to improve their bio-data come under this group and they need to search the employment options from time to time to get a better job resulting in higher level of Internet use by this group in Iraq.

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## Summary, Conclusion and Recommendations

Several factors influence the Internet accessibility and use in nations like Iraq. The factors like infrastructure development, level of income of the people, existing Internet technology in the market, nature of government policies and international and national political developments positively influence the rate of Internet technology development. The presence of strong regulatory authority also enhances the rate of development of Internet technology by encouraging the overall telecommunication sector (Gong and Sri Nagesh, 1996). At the same time, the element of competition operates through phenomenon of globalization and liberalization, which also affects the rate of development of Internet. Iraq also witnessed poor Internet development due to these factors mentioned here and in addition, its involvement in war with USA further aggravated the situation.

The results confirmed that human development indices, human capital, institutional legal environment, existing technologies and government policy making affected the Internet accessibility in Iraq considerably. In addition, factors like age, geographical location, gender, education and income level severely influence the Internet use and non-use in Iraq as revealed by the multinomial logit model used in the present study. People with MSc and PhD degrees have considerable level of Internet use in Iraq due to their involvement in academic and research works. Students also recorded highest Internet use rate due to their academic interest and due to higher interest in accessing information through Internet. The non-use of Internet was mainly found among high school and diploma students due to their lack of access to Internet facility compared to students with higher academic levels. Lack of awareness about the Internet use and poor access to Internet facility were also identified as the most significant factors that resulted in the non-use of Internet.

Based on these observations, the Internet use in Iraq can be enhanced through creating higher awareness among the people by conducting series of training programs, effective government policy for better science and technology prioritizing Internet and ICT technology in education sector and allowing most advanced Internet technologies into the domestic field, increased efforts for enhancing human development indices and human capital and facilitating institutional legal environment would certainly

eliminate the problem of low Internet accessibility. The efforts must be made to attract reasonable amount of foreign direct investment through multilateral linkages with other nations to Iraq for its best utilization for communication sector including Internet services. If more people have access to Internet, the policies of the government would reach the higher number of people through e-governance. Hence, strong and sincere initiative is required to maintain the strong linkage among the ICT industry, telecommunications and other key sectors of society affecting the growth of the Internet in Iraq through e-governance.

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## Progress and Innovation through Evaluation Intellectual Property

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*Practical assessment of intellectual property is a complex and difficult issue because there are many factors that influence it, and apply the methodologies differ from one country to another, from one continent to another. Therefore, the responsibility of carrying out transactions these intangible assets is maximum, because they have social implications and / or political.*

*Classical methods of assessment of intellectual property are the same as those used for measuring intangible assets or intangible.*

**Keywords:** *innovation, progress, valuation, intellectual property, intangible assets*

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Method for evaluating a complex asset companies enter the total value, in addition to items such as body size and value of intangible assets.

The accounting records of an enterprise, the intellectual property is included in intangible group assets, along with rights, relationships and other intangible grouped in Class 2 cost of fixed assets<sup>1</sup>.

In industrial or commercial environment, can be identified over 100 intangible assets: • **technical competence** (documentation, studies,

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<sup>1</sup> FAIGHENOV, M., *Evaluation of intellectual property - the economic and accounting issues*, INVENTION AND ECONOMICS, second year, no. 5 (17), May 1998, p. 11-15

licenses, patents, know-how and other objects of industrial property, copyright, computer programs, libraries, databases, quality assurance systems, qualification of personnel, etc.)<sup>2</sup>; • **commercial power** (promotion through advertising, for commercial, distribution, etc.); • **managerial competence** (quality, key managers, performance management, etc.); • **reputation** (the reputation of the company); • **site**; • **customers**; • **creditworthiness and solvency** to customers and banks; • **position to administrative and public bodies**.

Practical assessment of intellectual property is a complex and difficult issue because there are many factors that influence it, and apply the methodologies differ from one country to another, from one continent to another. Therefore, the responsibility of carrying out transactions these intangible assets is maximum, because they have social implications and / or political.

In essence, the valuation of intangible assets can be made by:

- evaluating a set of intangible elements as part of the company (Good Will);
- intangible assessment of a single element (or set) separately and independently.

Classical methods of assessment of intellectual property are the same as those used for measuring intangible assets or intangible, i.e. methods based on market comparisons, methods based on income, profits or turnover (cash flow method of the net; rate method fee) cost-based methods (legal analysis, technical analysis, business analysis, social analysis), methods based on the recovery period.

After completing an assessment for intellectual property, objects are advised to undertake a review of the correctness or susceptibility of this operation.

Intangible asset valuation approaches is made with the following groups of evaluation methods:

- future net income capitalization method;
- cost method;
- comparison method of market value;

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<sup>2</sup> FAIGHENOV, M., *Criteria and assessment methods*, INVENTION AND ECONOMICS, second year, no. 6 (18), June 1998, p. 29-33

- other methods.

Evaluation is a complex process that is not confined to groups use evaluation methods. Evaluation should know the basic principles of each method of evaluation and experience of firms specializing in this type of evaluation.

Valuation of intangible assets can be done by considering a set of intangible elements as part of the company or by a single item assessing intangible asset separate from the company.

Intangible elements are numerous and can be identified in the industrial and / or commercial (Table 1) after different characteristics.

Once identified, intangible elements can be classified in various ways.

**Table 1:** Frequent presentation of intangibles in the assessment activity<sup>3</sup>

No.	Name of intangible assets	No.	Name of intangible assets	No.	Name of intangible assets
1	Advertising	40	Goodwill	79	Folders with
2	Agreements	41	Government Contracts	80	Awards
3	Airport gates and	42	Government programs	81	Procedure
4	Plant assessments	43	Government records	82	Portfolio
5	Awards and	44	Historical Documents	83	Product design
6	Customer-bank	45	HMO promotion list	84	Use of property
7	Projects	46	Expired insurance policies	85	Outstanding
8	Libraries	47	Insurance policies in force	86	Proprietary
9	Brands	48	Associations	87	Proprietary
10	RTV broadcasting	49	Know-How	88	Proprietary
11	Purchase	50	Laboratory notebooks	89	Patented
12	References	51	Landing rights	90	Publications

<sup>3</sup> FAIGHENOV, M., *Criteria and assessment methods*, INVENTION AND ECONOMICS, second year, no. 6 (18), June 1998, p. 29-33

13	Chemical formulas	52	Leased Properties	91	Purchase orders
14	Claims	53	Interest in properties leased	92	Subject to
15	Software	54	Literary works	93	Reputation
16	Computerized	55	Issue bonuses and	94	Retail space
17	Contracts	56	Loan Portfolio	95	License
18	Cooperation	57	Location value	96	Charts and
19	Copyright	58	Contracts Management	97	Equity portfolios
20	Credit information	59	Database manual	98	Things in stakes
21	Contracts with	60	Manuscripts	99	Agreements
22	Lists of customers	61	Promotional and marketing	100	Legal rights
23	Customer relations	62	Masks and molds	101	Shares and bonds
24	Designs	63	Medical charts and files	102	Subscription lists
25	Development Rights	64	Rights to mineral resources	103	Supply contracts
26	Distribution	65	Musical composition	104	Technical and
27	Distribution Rights	66	Natural Resources	05	Technical
28	Drilling Rights	67	Newspaper Archives	106	Technology
29	Facility	68	Non-compete agreements	107	Technology-
30	Employment	69	Arrangements unabated	108	Pure plant
31	Technical	70	Open orders	109	Trade secrets
32	Rights on the	71	Options, warrants, grants,	110	Trained and
33	Patents radio	72	Ore deposits	11	Trademarks
34	Favorable financing	73	Patent applications	112	Training Manuals
35	Favorable leases	74	Patents-both product and	113	Non-proprietary
36	Aroma of food and	75	Models	114	Usage rights to
37	Arrangements by	76	Permits	115	Unfinished
38	Order by Francis	77	Contracts with individuals		
39	Business viability	78	Tenure rights		

## Methods of evaluation of intangible assets

- **Net income capitalization method**, consists in determining the **economic net income**. This income may be such **cash flow achievable** during the remaining economic life of the intangible asset, the nature of net **fees** or **net profit**.
- **Cost method**

The method involves determining the cost of production in certain conditions and it estimates the value of the item usable on the principle of substitution, after relations:

$$C_{in} = C_r - (U_{zf} + U_{zteh})$$

where:  $C_{in}$  is the new replacement cost,  $C_r$ , the cost of reproduction;  $U_{zf}$ , functional wear and  $U_{zteh}$ , wear technology.

$$V = C_{in} - (D_f + U_{zec}) - U_{ztehr}$$

where:  $V$  is the value,  $D_f$ , physical deterioration,  $U_{zec}$ , economic depreciation,  $U_{ztehr}$ , functional and technological wear recoverable.

**Replacement cost new** established maximum price that a prudent investor will pay for an intangible. If existing intangible is less useful than an ideal replacement, appropriate adjustments will be made regarding:

- Physical damage;
- Wear functional
- Wear (gap) technology;
- Economic depreciation (the external account).

Shortcomings of a recoverable intangible occur when expected profits from their removal than replacement cost (as materials, labor and time).

**The cost of reproduction** is the cost (at current prices) by establishing a precise duplicate of intangibility that using the same materials, standards, projects and skills.

**Replacement cost** is the cost to create (at current prices) an intangible that has the same utility as that. It is normal that will be used modern manufacturing methods with modern designs to current standards and current qualifications. The difference between replacement cost and reproduction cost is no bad failures. Examples of intangible assessment of which lend themselves to cost-based methods: software, databases, technical documentation, technical libraries, chemical formulas, recipes, food, etc..

**Remaining life** is estimated by considering the following: • remaining legal life (until the end of protection); • remainder of contract (to rent, for example.); • Normal duration of some regulations; • life physical remaining

life; • remaining functional life; • the remaining life technology; • remaining economic life (when not generate profits); • analyze mortality similar items.

Because the value obtained to be credible, must consider specific aspects rigorous evaluation. Cost-based method is relatively accurate, but completely ignore the effect of these charges

**Method comparable market value**

The method consists in comparing the market value (fair market value, exchange value) of intangible assets of the same nature and similar.

The method involves a systematic framework based on analysis of transactions of intangible elements that are considered comparable if: • ability to generate profits; • served market intangible; • past and projected return on investment; • Life used and remaining life predictions; • Time transaction; • degree and foreseeable risk of fatigue (physical, functional, technological and economic); • special conditions of the transaction (special financing, non-competitive agreement, etc.). The method is best but needs a rich data base, current and verifiable, so very difficult to obtain. Meanwhile, most times, more transactions relating to intangible assets which usually accompanies a tangible asset, in this case, a certain intangible price separation becomes extremely difficult.

Depending on certain situations imposed by nature intangible three assessment methods may be used preferentially in Table 2.

**Table 2:** Relevance evaluation methods

Intangible assets	Primary	Secondary	Low
Patents and technology	Income	Market	Cost
Trademarks	Income	Market	Cost
Copyrights	Income	Market	Cost
Management software	Cost	Market	Income
Software product	Income	Market	Cost
Distribution	Cost	Income	Market
Franchise rights	Income	Market	Cost
Company Procedures and Practices	Cost	Income	Market

In the case of intellectual property objects placed under linear damping, the assessment can be done by a special method taking into

account tax savings, the results from the introduction of depreciation expense.

The value of intellectual property (V) is given by:

$$V = V_p + V_a,$$

where:  $V_p$  represents the present value of economic profit from the exploitation of the subject property,  $V_a$ , the present value of profits resulting from the tax savings associated with depreciation.

$$V_a = V_a = \frac{V_i}{dr} \cdot s \cdot a_n, \text{ where: } V_i, \text{ represents the full value of}$$

amortizable intellectual property, and business income tax rate,  $dr$ , life remaining;  $a_n$ , factor current value of a unit;  $n$ , the number of years of remaining life.

## Assessing the costs and results of research development and innovation

Evaluation CDE projects (including projects of technological innovation) is mainly in the following cases: • merger between two companies; • Temporary association; • equity nature; • sale of a separate project by a potential customer; • determining the intrinsic value of a share; • privatization of enterprises.

If innovative enterprises where a large number of RDI projects, their evaluation is very important.

In most cases the privatized enterprises have not included the cost of privatization value of technological innovation projects and any other objects of intellectual property (asset).

In most cases, they are not recorded in the balance sheet intangible chapter or, if registered, their value was determined by the cost method of production and / or purchase.

Representative value of a project resulting from the CDI is the update / capitalization of future income stream generated by using the CDI project. Assessment and asset accounting default recording a CDI project, should be identified and clear tie between intangible asset (the project includes the concept of RDI) and Good-Will (goodwill).

**IAS 38** - Intangible assets (approved by the IASC in September 1938) contains details on terms to be used to define their criteria and conditions, the assessment and recording projects in accounting, intangible category. IAS 38 (paragraph 42) states that "*not recognized any intangible asset arising from research (or research phase of a project created by the business).*

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*Research expense (or the research phase of a project internally generated) should be included in costs when costs are incurred*

International Accounting Standards IAS 9 (revised 1993) - R & D expenditure and IAS 38 - Intangible Assets, addresses the general concepts and scope of the two concepts, namely "*research / development phase of a project internally generated*".

The concept of research is part of the definition of "*basic research*" and expenditure are recorded in operating expenses.

The concept of development is limited to technological innovation and is the definition of "*application of research results or other knowledge to design and develop projects designed to produce new or substantially improved materials, processes, products, processes, systems or services before the commencement of commercial production or use*".

The scope of development activity include: • designing, building and testing prototypes and experimental models; • design, construction and operation of pilot facilities involved equipping activities; • Design, construction and materials testing for new or upgraded processes, products, systems or services.

There are also activities not falling within the scope of research or development activities within: • scientific and technological information services; • Quality control, routine tests and tests on products; • necessary repairs as a result of disruption occurred during production; • Feasibility studies; • administrative and legal papers relating to patents and licenses; • routine work to improve the quality of a product; • adoption of existing capacity at the customer's practical needs; • routine design tools, appliances, etc. models; • engineering design and execution of construction, the relocation of their equipment to the location redistribution; • developing norms, standards, quality manuals, procedures, technical notebooks etc.

Where, for an individual project for IDUs, it can make a distinction between research and development, IAS - 38 states with the assimilation of all research expenditure and therefore does not allow accounting of project results as assets body, but as operating expenses.

For a development project can be evaluated and its value to be incorporated in the net asset value, with market value of other asset categories, five criteria must be met: the project is strictly individual, economic and technical feasibility of the project to be assured, there is an interest in the use of project results, there is a potential market, availability of financial resources, human or material

Technological engineering project appraisal is made using three classical methods: based assets (or cost) based on income, based on market comparisons.

As evaluation of technological innovation processes is a complex activity, it requires close collaboration between assessors and engineers in implementing the project and/or design engineers who can ensure accuracy and reasonableness in realistic estimate, which help establish a realistic value.

### **Evaluation of R & D expenditure and innovation (RDI)**

Evaluation of R & D spending and innovation (RDI) is only under certain conditions and in two distinct ways:

#### a) typical French approach

The evaluation is CDI projects before their completion and implementation. The main criteria for assessing the costs of R & D are:

- The payback period for the project and its implementation costs;
- The annual growth rate of turnover by implementing the project;
- Accessibility adaptability to new markets through products or services;
- Reduce costs and increase profit margin.

#### b) the typical American approach, that the audit costs of CDI.

The essence of this approach is the correct size of expenditure control and RDI, and thus to measure the costs of CDI normal size, normal size so it can be stated in the balance sheet.

With this approach, assessing the costs of R & D is focused on:

- reorientation of core competencies, total investment by reducing the size of the company through the restructuring of laboratories, eliminating duplicate activities are;
- resorting to external CDI, the cooperation and specialization
- CDI apparent productivity improvement through a rigorous selection of projects;
- shorter time to market of new products, integrating R & D in the enterprise process reengineering.

CDI's approach involves assessing the costs through several stages of analysis and measuring various economic effects.

If CDI projects, the valuation method is most relevant discount cash flow, so the update stream of cash flow and net residual value of  $\Pi$ .

Method of assessing the costs of R & D is identical to the specific economic calculations of a feasibility study.

**Evaluation results of research development and innovation (RDI)** of public funding should be made to include units executing their heritage.

Results of CDI, tangible and intangible, is focused on: forecasts, strategies, studies, designs, standards, regulations, software, technology and physical objects (prototypes, equipment, apparatus, facilities, etc.).

Heritage value of the results of RDI activities as physical objects, to be recorded in the accounts is determined based on the following links:

$$V_i = A_i \times (1-u) \times c,$$

where:  $V_i$  is the value on the assets,  $A_i$  coefficient updating value taking account of inflation, calculated on the period from the date of receipt of the physical object to his assessment. Update coefficient value will be determined according to data published in the Statistical Bulletin of Prices, published by the National Commission of Statistics,  $u$ , the degree of wear, determined on the basis of technical expertise,  $c$ , total costs of achieving physical object During development of the research theme.

The degree of physical and moral wear can be determined by the following situations:

- Physical wear and tear strength in the research process (mounting, dismounting, position, demonstration, testing);
- Natural wear caused on account of life fixed capital depreciation rules under the law;
- Obsolescence recorded following the publication of research results, the gap between the time the account was researched and to date has been applied;
- Registered obsolescence due to transfer fully the value of technical and technological information in the research.

Between stock value and book value are more significant differences that vary from one company to another. Thus, a medium sized company, failure to register accounts reached about 40% of its market value and a high-tech firm, over about 50%. In other words, **40-50% of the market value of listed companies, is the amount of unrecorded intangible assets on its balance sheet.**

Intellectual property includes intangible asset class whose property rights are<sup>4</sup>:

- patents, innovations, recipes, processes, projects, models, know-how;

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<sup>4</sup> STAN, V., S., *Methods for evaluation of patents*, INVENTORS AND ECONOMICS, second year, no. 10 October 1998, p. 34-36, 43-45.

- copyright;
- trademarks and product;
- franchise and licensing agreements;
- methods, programs, systems, procedures, companies, exploration studies, studies of forecasts, estimates, customer lists, technical information;
- software;
- other factors such as intellectual.

### Evaluation of patents

Exploitation of industrial property right, including patent, is made in different ways, in certain times and in certain geographical areas.

Setting heritage of a company must take into account the number of patents it holds marketable enterprise portfolio.

In this connection should be a selection of tradable certificates inactive (those who were not traded through a license agreement) without chance of recovery.

Surrender the right to use a patent is made by a contract of license. License transactions are classified into two categories: entrepreneurs and licenses granted to third parties licensed to subsidiaries or branches of a company<sup>5</sup>.

Licensing agreements are the main source for obtaining revenue.

Establishment fee rate is several ways:

- method of comparing profitability (MCP)
- hybrid method of comparison with transactions (HMCT)
- profit sharing method (PSM);
- residual method (RM)
- analysis of DCF (Discounted Cash Flow Analysis).

The most important aspect of licensing is royalty payment site. It can be calculated as a percentage, applied to the overall price of output sold. Royalty payment site is regularly at intervals agreed in the license agreement, usually each year<sup>6</sup>.

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<sup>5</sup> RIVETT, K., G., KLINE, D., *Discovering New Value in Intellectual Property*, Harvard Business Review, January / February 2000, p. 54-64

<sup>6</sup> IANCU, Șt., *Licensing Guide. Guidelines for a contract assignment or license for the transmission rights on inventions*, PHARE Project (restructuring of science and technology in Romania. Module Six: Stimulating demand technology), Bucharest, 1996

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By law, for a period of time, the patent provides a monopoly inventor<sup>7</sup>. To be sold or exploited, patents must be assessed. Evaluation of a patent is applied to its sale, through a license agreement or to determine the contribution made to the profit and / or capital of a company. Assessment of patent law is a complex issue which is under evaluation methods of intellectual property. To evaluate a patent, first must be accurately identified subject invention, then it must be analyzed in terms of legal, economic, social and technical.

Identifying the object of the invention is required to determine its usefulness. There are patents inactive and without opportunity to be exploited by the holder, including the assignment / license<sup>8</sup>. In these circumstances, the value of those patents is zero. Sometimes, these patents have a negative value, the fees paid annually by the holder protection. There are patents considered active (used in production at the valuation date, but with a real chance of implementation).

Techno-economic analysis of patent involves examining several specific elements of the invention, including those, which contribute to the recovery of the invention. In the appraisal process itself, is an economic analysis to determine profitability and economic risk. Because the degree of relativity you have valuation methods patents, a patent application in practice requires a high-risk investment.

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## Information Systems and Information Technology as Strategic Tools - Their Use in Albanian Business

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*The use of IS/IT has become strategic, impacting the way organizations think and act, linking their inside and outside operations through their effective use. After looking at strategic uses in developed countries, it is worth studying how organizations in Albania use IS/IT in their business processes for succeeding in their respective markets. The aim is to identify how strategically do they use IS/IT. Applying mainly quantitative research through both secondary and primary data, a framework of studying the IS/IT use in Albania, as a developing country, shows that Albanian business have to use more in depth IS IT to benefit in a better way for improving their business processes.*

**Keywords:** *IS/IT, strategic uses, business processes and management, effectiveness*

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### Introduction

Although information systems (IS) of some form or another have been around since the beginning of time, information technology (IT) is a relative newcomer to the scene. The facilities provided by such technology have had a major impact on individuals, organizations and society. As IT has become

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more powerful and relatively cheaper, its use has spread throughout organizations at a rapid rate.

Information can now be delivered to the right people at the right time, thus enabling well informed decisions to be made. Previously, due to the limited information-gathering capability of organizations, decision makers could seldom rely on up-to-date information but instead made important decisions based on past results and their own experience (Galliers and Baets 1998). This no longer needs to be the case. With the right technology in place to collect the necessary data automatically, up-to-date information can be accessed whenever the need arises.

Today, most organizations in all sectors of industry, commerce and government are fundamentally dependent on their information systems. In the words of Rockart (1988) we can see that Information Technology has become inextricably intertwined with business. Different levels in the management hierarchy are now using IT where once its sole domain was at the operational level. The aim now is not only to improve efficiency but also to improve business effectiveness and to manage organizations more strategically. As the managerial tasks become more complex, so the nature of the required information systems (IS) changes – from structured, routine support to *ad hoc*, unstructured, complex enquiries at the highest levels of management.

IT, however, not only has the potential to change the way an organization works but also the very nature of its business (Galliers 1989). Through the use of IT to support the introduction of electronic markets, buying and selling can be carried out in a fraction of the time, disrupting the conventional marketing and distribution channels (Malone et al. 1989).

On a more strategic level, information may be passed from an organization to its suppliers or customers in order to gain or provide a better service (Cash 1985). Providing a better service to its customers than its competitors may provide the differentiation required to stay ahead of the competition in the short term (Holland 1998). Continual improvements to the service may enable the organization to gain a longer-term advantage and remain ahead.

Different articles often did more than describe what organizations had done: they considered how the advantage had been achieved and proceeded to suggest how any organization might analyze its business and

identify similar opportunities. In many cases, a tool or technique was described and substantiated by selected examples (F.W. McFarlan 1984).

## **Strategic Uses of Is/It in Organizations**

The four main types of strategic system appear to be:

1. those that share information via technology-based systems with customers/ consumers and/or suppliers and change the nature of the relationship;
2. those that produce more effective integration of the use of information in the organization's value-adding processes;
3. those that enable the organization to develop, produce, market and deliver new or enhanced products or services based on information;
4. those that provide executive management with information to support the development and implementation of strategy (in particular, where relevant external and internal information are integrated in analysis).

Benjamin et al. (1984) divided the types of potential opportunity between those that focus on either the competitive market place or internal operations.

Within each, IS/IT can be used to improve traditional ways of doing business or to cause 'significant structural changes' in the way the company does business. Notowidigdo (1984) divided strategic information systems into:

- internal systems that have direct benefit for the company;
- external systems that have direct benefits for the company's customers.

A similar approach was adopted by Venkatraman (1990) in assessing how the strategic benefits from IT resulted from increasing degrees of business change (and risk!). He described three types of 'revolutionary' uses of IT, which require considerable transformation in terms of what the organization does or how it does it:

1. business process redesign—using IS/IT to realign business activities and their relationships to achieve performance breakthroughs;

2. business network redesign—changing the way information is used by the organization and its trading partners, thereby changing how the industry overall carries out the value-adding processes;
3. business scope redefinition—extending the market or product set, based on information or changing the role of the organization in the industry.

The four categories suggested above seem to cover many of the possibilities. Each of these types of strategic IS/IT application has different implications in terms of identification, planning and implementation (Sampler 1998).

### **Linking to Customers and Suppliers**

The key people involved in the consideration of external linkage systems will be sales/marketing and distribution management at the customer end, or purchasing/receiving/quality-control managers at the supplier end. Applications of this kind require a strong drive from the sharp-end line management (Hamel 1998). Also, they are not entirely in the organization's power to control—since suppliers, customers and competitors may take the initiative at any stage—and obviously any such system will require the cooperation of trading partners. E-procurement and web-based ordering systems have enabled new, but low-cost linkages with customers and suppliers, some systems even permitting customers to track online the progress of orders.

### **Improved Integration of Internal Processes**

To produce effective internal integration of information requires the organization to overcome some of the traditional barriers to successful IS/IT application: sharing information, reorganization of roles, etc. All of the relevant information about the customer and the organization's ability to deliver is required at the point of selling to make it effective. This is what organizations are seeking to achieve with the implementation of customer relationship management systems (CRM). Enterprise resource planning (ERP), on the other hand are configurable information systems packages

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that integrate information and information-based processes within and across functional areas in an organization (Davenport 1999).

Senior management need to understand the organizational implications of this new information-based approach to the roles of people and departments, since reorganization will probably be required if significant benefits are to be obtained and any relative advantages sustained.

### **Information-based Products and Services**

In using IT and especially the Internet, many organizations have looked to add more value to the tangible products they sell, by providing additional information-based services. These can include online support, order tracking, order history, etc. Many of these initiatives focus on deepening the relationship with customers and suppliers. Others have moved their trading platform either partially or entirely onto the Internet (Kettinger et al 1994). Using e-procurement, companies permit their customers to ‘empower’ their employees to make purchases websites of non-core, low value, with them managing the total process, including establishing purchasing controls. These purchasing control rules cover specific pricing, spending limits, barring the ordering of particular products, cost codes, blanket orders, and order passwords.

### **Management Implications in Using Is/It in Business Organizations**

A second aspect of the analyses of our research base identifies some of the key factors that seem to recur frequently and underpin success. Few strategic information systems show all of the factors, but many show a number. Again, these factors are often at odds with traditional IS/IT approaches and show more commonality with business innovation.

**External, not internal, focus:** looking at customers, competitors, suppliers, even other industries and the business’s relationships and similarities with the outside business world. Traditionally IS/IT was focused on internal processes and issues, but nowadays more and more benefits of using IS IT

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are focused in the external relationship of the company with different business partners.

**Adding value not cost reduction.** Although cost reductions may accrue due to business expansion at reduced marginal costs, ‘doing it better, not cheaper’ seems to be the maxim. This is consistent with the requirements of companies to differentiate themselves from competitors— better products, better services—to succeed. Historically, IS/IT was seen as a way of increasing efficiency—doing it cheaper—and, while this is obviously important in any business environment, it is not the only way to succeed. This enables the company to coordinate harvesting decisions with inventory and transport requirements and match those decisions to market needs.

**Sharing the benefits:** within the organization, with suppliers, customers, consumers and even competitors on occasion! In many cases in the past, systems benefits have not been shared even within an organization, but used instead to give departments or functions leverage over each other. This reduces the benefits and does not allow them to be sustained. Sharing benefits implies a ‘buy in’, a commitment to success, a switching cost. Almost all of the examples involve sharing the benefits, with suppliers, customers, consumers and competitors, to provide barriers of entry to the industry.

**Understanding customers and what they do with the product or service:** how they obtain value from it, and the problems they may encounter in gaining that value.

**Business-driven innovation, not technology-driven:** the pressures of the marketplace drove developments in most cases. This tends to cast doubt on the idea of competitive advantage from IT, but, in practice, it means that new or existing IT provides or enables a business opportunity or idea to be converted into reality. The lead or the driving force is from the business, not necessarily, a traditional route to using IS/IT, which has often been driven by technology, pushed by the IT suppliers and professionals, not pulled through by the users. It is only relatively recently that the latest technology has become of interest to business managers. But the business issue does not

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change: why take two risks at the same time—that is, a new business process based on new technology? It is a recipe for failure! Keen (1991) summed it up well by saying, ‘Major failures in using IT are often based on much better technology and bad business vision. Successes come from good enough technology and a clear understanding of the customer.

**Incremental development, not the total application vision turned into reality.** Many examples show a stepped approach—doing one thing and building on and extending the success by a further development. To some extent, this is developing applications by experimentation but also not stopping when a success is achieved but considering what could be done next. This, again, is against the traditional notion of clarifying all requirements, defining all boundaries and agreeing the total deliverables of the system before embarking on the expensive, structured process of design and construction, freezing the requirements at each stage. Prototyping of systems obviously has a key role to play here.

**Using the information gained from the systems to develop the business.** Many mail order and retailing firms have segmented their customers according to the purchasing patterns shown by transactions and then providing different, focused catalogues or special offers. Product and market analyses plus external market research information can be merged and then re-cut in any number of ways to identify more appropriate marketing segmentation and product mix.

As discussed above, these factors, in general, imply different attitudes to the use of IS/IT than have prevailed in the past, implying that we need new ways of thinking about IS/IT techniques to uncover such opportunities, and then new approaches to managing these applications to ensure success. Another general observation can be made from these examples, by considering what actually produces the success—information technology, information systems or information. Technology itself is the ‘enabler’, which provides short-term advantage and the opportunity to develop new systems and to capture and use potentially valuable information. But, normally, competitors will be able to purchase the same technology, and any advantages could soon be negated. However, the new information systems that developed, utilizing the technology, could provide

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advantages that may be less vulnerable to erosion by competitive copying. The potential gain will depend on how conclusively and exclusively the systems alter business processes and relationships.

In time, however, the existing competition or new entrants enticed into the profitable parts of industry could redefine the relationships by introducing alternative information systems. If the firm wishes to sustain its competitive advantage, it must use the information gleaned from its systems to improve its products or services—to match the requirements of the marketplace or influence its development.

By viewing IS/IT evolution another way, we can portray the management implications ascending from the basement of the business to the penthouse executive suite, from where strategic vision is possible and, more importantly, IS/IT can be incorporated into senior management's 'theory of the business' (Keen 1995).

King (1987) expressed concern that he saw 'evidence that the competitive advantage argument is beginning to be used excessively—primarily to rationalize projects that cannot otherwise be justified.' This causes the idea to lose management credibility. He noted that we must manage IS/IT and its various applications in accord with the type of contribution it is making—improving efficiency, effectiveness and/or competitiveness through business change—not elevate all aspects to a new and artificial plane of importance. But, of course, an organization cannot afford to ignore the strategic opportunities that IS/IT may offer, and, therefore, 'the potential of information as a strategic resource should be incorporated as a routine element of the business planning process, so that all managers become used to thinking in these new terms.' Earl (1992) supports the argument that focusing on the technology itself does not lead to its successful strategic application. He suggests that the most effective route to achieving strategic benefit from IS/IT is to concentrate on rethinking business by analyzing current business problems and environmental change—and considering IT as just one ingredient of the solution.

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## Important ICT Indicators and Methodology of the Study

Different countries have different characteristics of development, especially in relations with the private sector, so they have different status and aims in using ICTs. Organizations particularly business ones show different behavior regarding use of IS/IT. Identifying and explaining this behavior would be possible only by using the right indicators.

In terms of ICTs, indicators may be classified in different ways (Sciadas 2005). A distinction can be made between demand and supply side indicators. Demand-side indicators are based on information collected from users of ICTs and supply-side indicators on information from service providers. One can similarly talk about macro and micro indicators. Macro indicators could be ratios of macroeconomic variables like total factor productivity, GDP and Investment. ICT investment divided by total investment in a country could be such a macro indicator (Miles et al 2006). An equivalent micro indicator would be the average ratio of ICT investments to total investment at firm level. A further distinction could be by users of ICTs: household indicators, individual indicators, business indicators, school indicators, health indicators, government indicators, trade indicators, ICT sector indicators, gender indicators etc.

An important distinction to keep in mind when considering ICT indicators is the one between access, usage and impact. Access indicators measure what people or businesses have in terms of ICTs or how many exist in a country. Usage indicators measure how and for what ICTs are being used by households, individuals, businesses or governments (Stork and Esselaar 2006) etc. Impact indicators capture the impact of access and usage on economic growth, employment creation, improvement in public service delivery on a macro level; and company performance, household poverty levels and social inclusion on a micro level, to give just a few examples. Impact indicators are usually derived from analysis of primary or secondary data. The access and usage indicators classified as core indicators are undoubtedly useful indicators of development. However, the information required to compute many of these indicators is not available for most developing countries (Lopes-Claros et al 2006), so secondary data are not useful in these cases, also in the case of Albania.

Since our primary purpose in this paper is to evaluate the ICTs and their use within organizations in Albania, we have to look mainly at use and access indicators, regarding them. Several important international organizations such as International Telecommunications Union, UN commission on development, World Bank and World Economic Forum, etc. After having a deeper look on them, we can see below the indicators used by UN Commission. The UN Statistical Commission has endorsed in 14 Mar 2007, a core list of indicators on information and communication technologies (ICT), grouped into four categories:

- Technology infrastructure and access;
- Access and use of information and communication technology by households and individuals;
- Access and use of information and communication technology by businesses;
- Information and communication technology sector and trade in information and communication technology goods.

We must focus now at the third point above and see which are these indicators to continue with the development of the research means.

Table 1, to b placed here, is used to develop part of the questions of the business survey. 220 questionnaires are distributed throughout all the country, based upon the percentage of distribution of business organizations according to country administrative areas. The non-responsive ratio was less than 10 percent, because 200 out of 220 questionnaires were returned and analyzed. Business from different sectors and sizes answered the questionnaire. Therefore, 87 percent of the companies were small, according to the number of employees, 1-9 employees, 8 percent of the companies are medium in size, 10-80 employees, while only 2 percent are large companies with over 80 employees. This percentage reflects the ratio of companies in Albania, according to the data about business size. The percentage of companies according the sector is also distributed as following: 32 percent in financial industry, 20 percent in tourism, 15 percent in other services, 28 percent in production and construction, 5 percent are state owned companies or organizations. This distribution reflects the developing of the country. 61% of the companies has reported a growing demand for their products/services, while 39 percent reported a declining demand.

Percentages of business that use computers, Internet, LAN, or other information technology means are explained in the descriptive statistics. On the other hand, the relationship between different characteristics, such as business activity type and sector, business size according to number of employees, etc., and the behavior of the companies regarding IS IT is shown through the use of contingency test ( $\chi^2$ ). The critical value for the probability  $\alpha = 0,05$  are compared with the calculated values from the differences between observed and expected values. Expected values are calculated based upon the zero hypothesis that states these differences are only a result of the not as significant as to show about real differences in the population, so a real dependency between variables mentioned above.

## Level of usage of ICT in Albanian Businesses

An important indicator of technology use in organizations is the number of computers. According to the questionnaire, it can be seen what is the percentage of the organizations that have at least one computer. As it can be seen by the Figure 1, to be placed here, this ratio is very high because about 98% of the organizations have at least one computer. So the basic technology is spread throughout the organization. But, is there anything more to say? The number of computers is only an initial indicator, as we mentioned before. In the questionnaire, there are questions regarding the quantity of computers related with the number of employees, but not only. Quality indicators are not left aside. Knowledge required from employees in ICT as well as trainings needed are analyzed hereafter.

Therefore, Figure 2, to be placed here, shows more about the use of computers in organizations. Only in 17,6% of the organizations, all the employs have computers, while 39% of them have computers only for operational level and around 43% have computers only for the managers. So, according to the number of employees that use computers in organizations, it can be said that:

1. a greater number of organizations have computers, but a lower number have computers for all the employees.
2. *the penetration level of technology is low, there are still many organizations which can use computers in all management levels, at least for job automation.*

Another indicator on technology use is the number of organizations with Internet connections. In Figure 6 is shown that there is a considerable number of organizations, 76 % of them, that have Internet access. The service of ISPs is one of the most required in Albania, nowadays. This indicator, on the other hand shows nothing about the quality of use of Internet as well as benefits of its use for the organizations. There is a need for more investigation from the functional point of view, why and how organizations use Internet services in improving its business processes, and what quality is required from them.

In Figure 3, to be placed here, the greatest part of organizations, around 41%, use the Internet for searching information, while a smaller part, around 28% use it for communication with third parties, 20% use it for communicating with clients and only 10 percent use it for internal communication. In fact, using Internet only for information search is a limited use from the point of view of organization and Information systems. Nowadays, Intranets and Extranets<sup>i</sup> are using the Internet as a universal communication platform, inciting more efficient relationships between organizations and their clients or business partners, without the need for specific software. Looking at the low percentage of the organizations that use Internet as a communication tool between them and clients as well as for internal communication, we can say that in most of the cases organizations would not benefit from the use of Intranets and Extranets. On the other hand, *it can be seen that the communication with third parties is important for the companies showing a focus on operational aspects of their businesses, relations with suppliers and government institutions. These relationships will be the first to incite more uses as well as the further raising of this market.*

The kind of connection is also showing the requirements of companies regarding quality of use of the networks. *The greater the speed required, the more organizations are looking forward to support important relationships and operations, specific and complicated, the most important is considered the speed of transmission regarding the exchange of data, information and knowledge.* From the Figure 4 it can be seen that 33% of organizations have a low speed Internet connection, 48% of them have medium speed of Internet connection, while only 17 % have a high speed Internet connection. It must be also said that low, medium and high speeds

have different measures than European countries or USA statistics. Anyway, in this study we refer prior exploratory studies regarding Internet Services and their capacities in Albania as well as organization systems requirements. If these speed standards in Albania are compared with those of e-business Watch<sup>1</sup> studies, the categories are very different, as a cause of a different phase in which Albanian ICT market is compared to European market. Another component of ICT use in organizations is networks. Organizations that have achieved the effective construction and use of the networks are in fact pursuing the right path to the creation of value. Which type of networks are the most used in Albania? Figure 5 shows that 21% of organizations use an Intranet, 29% have a LAN, 12,5% are using a WAN, 10,5% are using an Extranet and 27% are not using any network at all. As we can see from the figures, there is a considerable percentage of organizations that are not using networks, as well as, the greatest part is using a LAN, that is in Local Area Network, limited in a small, company building area. This means that there is still a lot to be done in regard of adding value to their product through ICT and IS.

Web presence is one of the media to ensure a long relationship with clients, suppliers or other stakeholders of the organizations. Little difference exists in the percentages of organizations with or without a presence in the World Wide Web, 52% the 48%, in favor of organizations with a Web site. These figures show that there is much more to be done for the organizations understand the benefits of using this World Wide Web. In fact, the use of web sites from organizations in Albania is limited in most of the cases to a simple publicity media, giving information and inciting potential clients, but not exploiting all the potential that a web site could give. In fact Web-sites of Albanian organizations are often nice but not functional for the visitors. They also have little or no e-commerce features. Therefore, they really do not contribute in on-line communication between buyers and sellers, giving them little value.

The discussion now tries to find out, not only the knowledge of respondents about the benefits of using ICT in organizations, but above all, their perceptions on the benefits in organizations. In the Figure 7, it is seen that benefits that are evaluated most on average, are the raise in efficiency,

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<sup>1</sup> Telecommunication market study in Europe 2007

information about control and report and the raise in client value. As we can see from the graphic, the average evaluations for these features are respectively 4,4; 4,2 and 4, in Likert scale from 1 to 5 according to the importance in the organization. The other three elements, popularity and image, opportunity to create competitive advantage and the impact in costs, are considered less valuable in average. Even though, for all the characteristics the mean estimation is more than 2,5, which is the mean of the Likert scale, which shows that they are all considered important and all the respondents perceive the impact of ICT in their organizations, regardless whether it really bring benefits to them.

Another indicator in this regard would be the number of companies that have IT department. From the Figure 8 it can easily be seen that a smaller number of companies have IT department in comparison with those which do not have one. The figures are respectively 38% and 62%. In fact, organizations with an IT department are those, which can afford this department through their operations and consider its presence as necessary. Since this percentage is actually low, there may be place for changing attitudes if companies perceive ICT role as important in their organizations.

After the descriptive statistics that show the state of the important indicators for Albanian companies, we can take a deeper look in the relationship between variables. Table 2 shows the calculations about contingency test as well as the critical values. From the figures, we can see that there is no relationship between company size and the use of ICT represented by variables such as Internet usage, Website presence or computers within the organization. While there is a relationship between type of activity and the existence of IT departments within companies, or sector type and type of nets used. On the other hand, there is also a relationship between sector demand and ICT use.

## **Conclusions and Recommendations**

Information systems and Information technology have become an important element of modern organizations. The aim of using technology has changed a lot over the years. Now it is important not only to improve efficiency but also to improve business effectiveness and to manage organizations more strategically, through IT use.

Strategic uses of IT include the ability they give to companies to:

- Link to Customers and Suppliers
- Improve Integration of Internal Processes
- Market Information-based Products and Services
- Improve profitability

Managers can improve a lot of their work focusing not only to internal operations of their organization, but also to external environment. IT can be used to add value, not only to reduce costs, as well as to share benefits with other actors interested, such as customers and suppliers and third parties. Companies can understand customers and their needs a lot better through the help of IT. Even if we can say that IT /IS are more important for the entire organization, the innovations should be business-driven, not technology-driven, helping so business processes to improve company profitability and goal fulfillment. So the information gained from the systems must be used a lot more to develop the business.

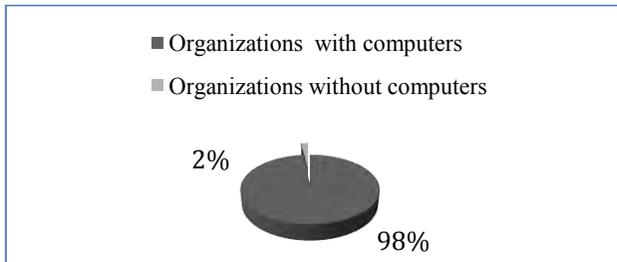
Companies in Albania are not exactly in the same situation about technology use. They are eager to invest in technology, and have a relatively high dispersion of technology, but problems arise with employees and their skills to use technology. They also use technology more for information search or communication, mainly outside organizations through public lines and Internet, while only few organizations use IT for adding value to their product/service and improve their operations and business processes, in favor of profitability. The benefits of using IT in Albanian organizations are limited in organizational efficiency, especially with cost savings, in most cases. Less used are IT for improving relationships with customers or fronting competition and building competitive advantage. Strategic uses of IT are far from being the usual Albanian case.

The characteristics of the companies that affect the usage level of IT are mainly the type of sector and the demand for products/services in the sector. These characteristics would be a good incentive when talking about improvements in using technology.

So companies should construct their IS and choose the appropriate IT elements depending on the sector they are exercising the business. This will help also understand better their customers and business processes to be reviewed in order to benefit fully from the use of IT in organization.

**Table 1: ICT indicators**

ICT indicators	Classification	Source
Proportion of businesses using computers and the Internet Proportion of employees using computers and the Internet Proportion of businesses with a Web presence, an intranet Proportion of businesses receiving orders over the Internet or placing orders over the Internet Proportion of businesses using the Internet by type of access Proportion of businesses with a local area network (LAN) Proportion of businesses with an extranet	Demand side Access indicator	Business survey
Proportion of businesses using the Internet by type of activity	Demand side Usage indicator	Business survey



**Figure 1: Percentage of organisations with computers**

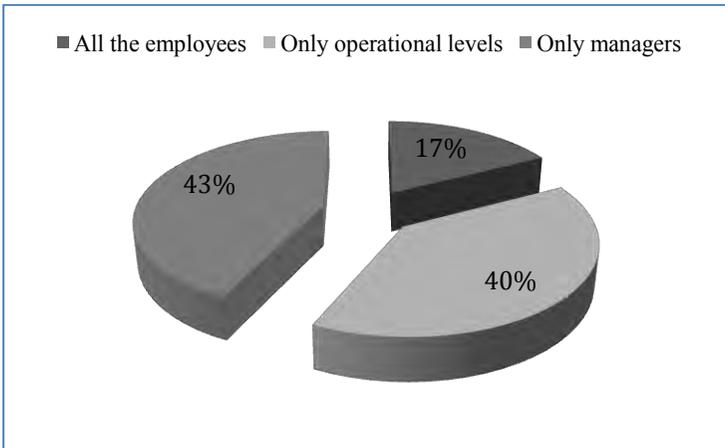


Figure 2: Percentage of companies according employees with computers

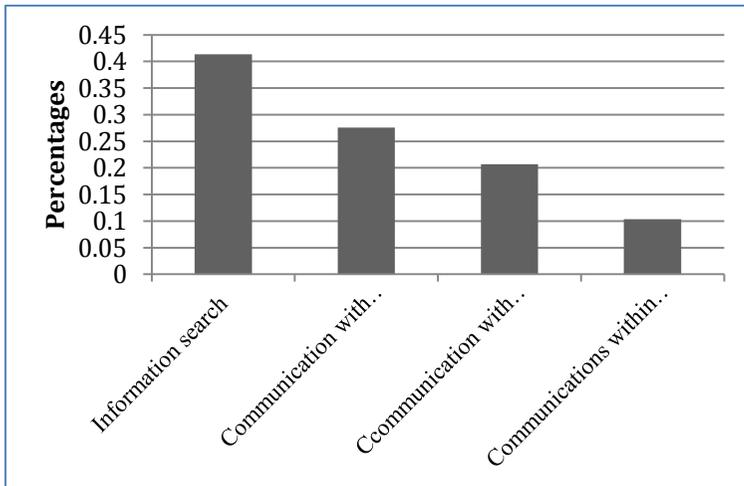
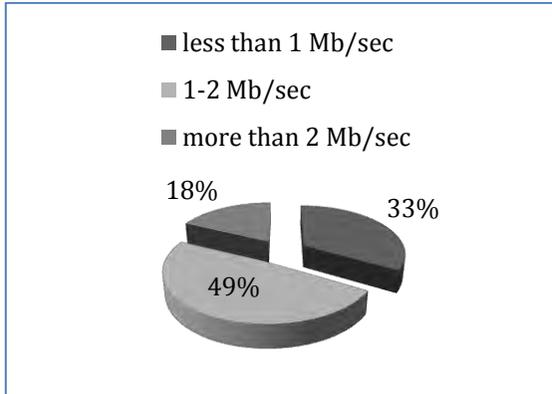
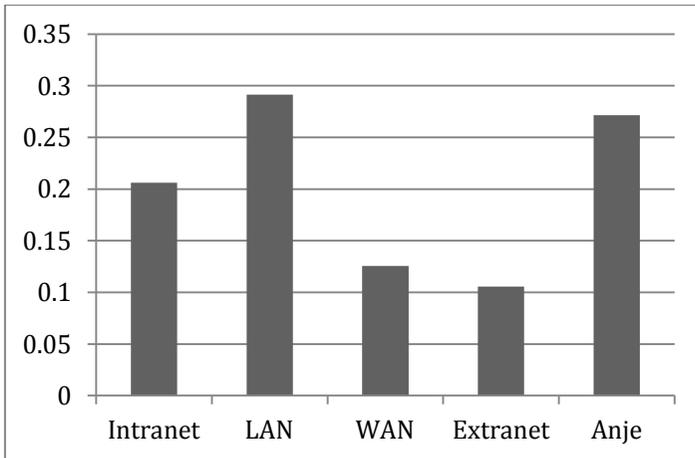


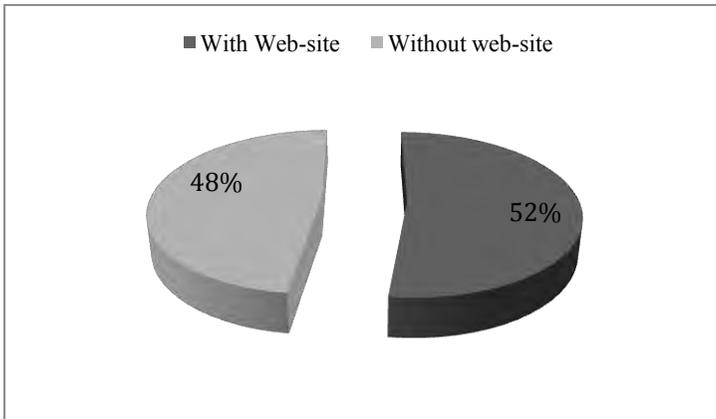
Figure 3: Internet use in organizations



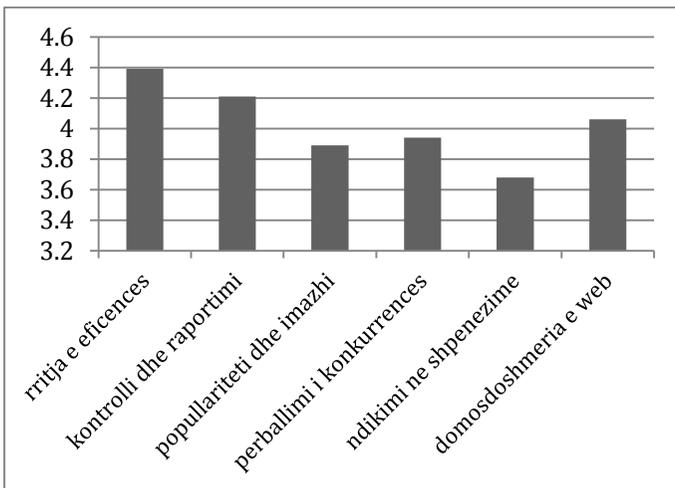
**Figure 4:** Percentage of companies according to type of Internet connection



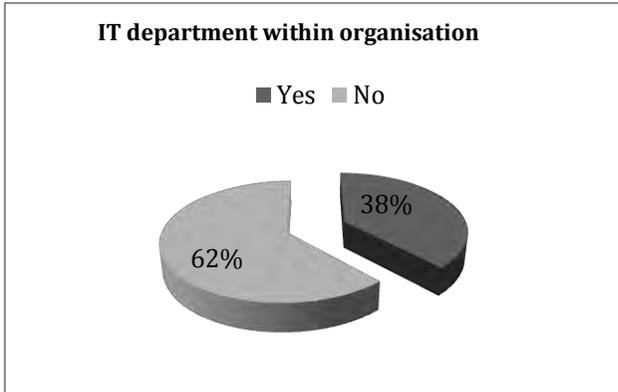
**Figure 5:** Percentage of organizations according to types of networks used



**Figure 6:** Organizations with web site



**Figure 7:** Perception of benefits of IS/IT in organizations



**Figure 8:** Percentage of companies with IT department

**Table 2:** Relationship between ICT use and company characteristics

Variables		$\chi^2$ value	$\chi^2$ , Critical value according to type of error $\alpha$	Hypothesis Ho
<b>Hypothesis Ho: There is no relationship between independent ( column 2) and dependent (column 1) variables</b>				
Employees with computers	Company size	1.11	12.59	Accepted
IT Department	Sector type	6.6	5.99	Rejected
Types of Networks used	Sector demand	7.01	5.99	Rejected
Internet usage	Company size	2.95	16.92	Accepted
Types of Networks used	Sector type	4.32	9.49	Accepted
IT Department	Sector demand	6.93	5.99	Rejected
Types of Networks used	Sector type	8.59	7.81	Rejected
Website	Company size	4.5	7.81	Accepted
Website	Sector type	0.06	5.99	Accepted
IT Department	Company size	3.25	5.99	Accepted
Website	Sector demand	9.43	7.81	Rejected

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## Economies of Emerging States and Foreign Trade in the Knowledge Economy<sup>1</sup>

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*The current society has brought in the foreground of its preoccupations the foreign trade as a factor of recovery and development, especially in the case of the emergent states.*

*Starting with Adam Smith and David Ricardo, theories of the foreign trade have been built to demonstrate the advantages that trades might bring to the partners. There are “voices” that support the idea of the inferiority of emergent economies in the international trade plan, so in the present papers we aim, without condemning this opinion, at arguing that in nowadays society foreign trade remains the major and most direct way, for the emergent economies, of access to knowledge and to its results.*

**Keywords:** *knowledge based society, knowledge, international trade, economic growth, economic development, developing economies*

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### Introduction

Trade was and will remain the activity that has accomplished, over time, the tightest relations between countries and the ground that maintained and developed these relations.

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Knowledge, under the form of technical progress, deepened the international technological division of labor, leading to the differentiation of the levels of economic development between the countries. Thus, “international trade is extended and deepened where and whether there are conditions for the manifestation of technical progress” [1].

At both theoretical and practical levels, there is a tendency to liberalize the trade exchanges. International trade allows all the partners' wealth to increase, as well as their economic and social development and growth. In spite of the multiple advantages that trade exchanges provide, there is a fear that the emerging states would in fact be vulnerable in the foreign trade relations. They are exporters of raw materials, resources and partially processed products, which on the international market are traded at relatively low prices, while they import products that incorporate a high degree of knowledge, generally transposed in technology, investments, management methods, i.e. elements that increase the costs and implicitly the price on the market. The difference between export and import favors a trade deficit that strengthens that of the balance of trade. Other two disadvantages of the emerging states are the persistence in developing themselves extensively and not intensively, and the increasing degree of dependency upon the developed states.

A report of the World Bank entitled *Global Economic Prospects of Developing Countries* [2] stated that the extension of the trade exchanges will lead to the rise of the annual rate of GDP with 0.5% on the long run, and that by 2015 about 300 million people in the developing and weakly developed countries will exceed the poverty threshold. The developing countries are considered to benefit from an income rise, following the application of the policies of industrial liberalization.

In the last 250 years, except for a short span (1913-1950), the trade growth had consistently exceeded the general economic growth. Between 1720 and 1913, the trade growth was about 1.5 times bigger than that of GDP. Between 1913 and 1959, the trade dynamic was more reduced because of the two World Wars and of the protectionist policies. This period also covered the big economic world crisis of 1929-1933, when trade registered, in quantitative terms, an unprecedented reduction of 60%, the states exporting their own economic crises, including unemployment, by the agency of the protectionist commercial barriers.

After 1950, trade has developed faster than production, and the extent to which national economies base upon international exchanges in the general economic activity increased. In the span 1950-2003, the average annual increase of goods exportation was 6.5%, compared to a 4.3% increase of the production [3].

Around 2000, a given economic decline was noticed simultaneously in three major commercial regions: USA, Europe and Asia, so that the rhythm of trade growth decreased from 13% in the '80s, to 1% in 2001. Under these circumstances, the emergent states faced a 10% reduction of the export demand, which affected the rhythm of their economic growth. The report of the World Bank reveals that the impact of the economic decline on the first 6 developed regions of the world significantly varies according to the evolution of the exports. The countries in Latin America and eastern Asia, with a high level of exports of industrial products, were the first to experience the impact of a much-reduced demand in the imports of USA and Japan. Yet, due to a slight simultaneous recession in USA, Europe and Japan, all the world regions registered slower rhythms of economic growth. In spite of the circumstances of the early 21st century, the long-run prospects for the emergent countries are optimistic, on the basis of the improving management at the macro-economic level, of the economies increase, of a faster market opening, of a production diversification and especially of a significant effort to face the world economic crisis, considering also that the home market responds with difficulty and in contrast with the expected macro-economic objectives.

## **Comparative and Competitive Advantages in Foreign Trade. Income Sources**

The trade incomes generally have two sources: those who come from perfect exchanges and those coming from specialization. Any economy will profit from foreign exchanges, because they allow the mutually advantageous exploitation of the differences of taste, technologies, endowment with factors or levels of culture and civilization, etc., i.e. of the results of knowledge. The comparative advantages of economies in the international trade are grounded by these differences. The incomes coming from the perfect exchanges appear when the partner countries evaluate

differently the resources they have, and so appears the possibility that the exchanges take place with mutual advantages. Each country exports with a view to obtaining other goods and services that it needs by importation.

It is also necessary to make the difference between comparative and competitive advantages. The theory of the comparative advantage explains the favorable natural conditions existing in a national economy or the reduced costs of some factors compared to the ones in other national economies for the development of some branches and it suggests an orientation for the specialization of the national economy. On the other hand, the competitive advantage has a dynamic character, at both the micro- and the macro-economic levels, underlining the fact that the evolution, development and specialization of the local economies particularly depend upon the degree of competitiveness of companies on the national and international markets, as well as of the economies in general, which is given more and more frequently by knowledge.

The principle of the comparative advantages states that all developed and emergent states have profits from trade, even if they are less efficient in some activities or less equipped with factors of production. It is necessary, in order to obtain mutual incomes from trade, for differences to exist in the relative efficiency in production or in the relative equipment with factors of the countries.

Between the international production and the international trade there is a reciprocity relation. Generally, one can distinguish three main types of international production:

- one based *upon resources* or intended for export;
- one represented by the *production oriented towards the*

*local market that replaces imports. The international production oriented towards the local market or replaced imports* can lead to effects of trade creation. Trade is directly created when the mother-company or other suppliers in the source country export towards the target country new components with a view to their final processing by the local subsidiary, the products thus obtained being complementary to the first and intended for re-exportation. Indirectly, the presence of the subsidiary in the target-country could lead to an increase of the demand of this country for other types of products that are going to be bought at least on the short-run by the agency of imports. This second type of international production, oriented

towards the local market or which replaces imports, occurs with a comparable development.

- one represented by the *rationalized production* or the *internationally integrated one*, based upon resources and originated in the activities of the multinational companies, taking place in the emergent states, with a view to the exploitation of the local resources of raw and semi-processed materials in these economies and, more recently, oriented towards cheap labor force. The effects upon the international trade are visible, first of all, in its promotion and secondly, this type of production directly stimulates the exports from the source-countries, by the export of production equipment and the exploitation of resources and, as well as indirectly, by the re-exportation of manufactured goods with lower prices towards third-party countries. The most complex relationship with the international trade is developed by the *rationalized or internationally integrated production* [4]. This is the result of the development of the activities carried on by those multinational companies whose branches and subsidiaries are specialized in certain operations of production as part of the international structure. This type of international production generates trade effects for both the source-country of the investing company and the target-country.

Whereas the *resource-oriented production* generates exports from the target-country to the source-country, and the *production oriented towards the local market* can lead to the increase of exports from the source-country to the target-country, the last type of production, the *integrated one*, creates the possibility for both exports and imports emerge for the partners, including therefore the emergent states.

## Foreign Trade and its Economic and Social Importance

Foreign trade is a necessity especially for the emergent economies, a fact that the classical economists stated too. John Stuart Mill said that “openness towards foreign trade... sometimes has the effect of an industrial revolution in a country whose resources are in a deficit” [5]. But the

participation in the foreign trades is not enough, other conditions are also necessary to bring forth the beneficial effects of the foreign trade.

The foreign exchanges have been regarded as the *engine of economic growth*, especially in the developed countries in the 20th and 21st centuries. The fast expansion of the external markets contributed in the increase of the local demand, but it also represented a stimulus in the affirmation of production together with its diversification. The efforts made with a view to increasing the degree of knowledge and trade liberalization contributed to the free circulation of capitals. Unlike the developed countries, the emergent ones have a completely different situation. Except for the ones in Eastern Asia and Latin America, the developing economies still come across difficulties and occupy a sometimes unfavorable position in the hierarchy of the world big commercial powers. Both quantitatively and qualitatively, exports have followed an extensive development, but it cannot be compared to the one in the developed countries. The latter's, due to the utilization, in production, of the results of knowledge and especially of technical progress, have become increasingly competitive, bringing to the market more and more new products, while the emergent countries did not manage to always valorize even their traditional goods. The only fields that have showed some signs of revival were the ones based upon the extremely low costs of labor, like the textile, clothing, raw materials and intermediary product industries.

We notice that in the case of the emergent countries, the share of the primary goods was the biggest one in the total of exports, while in the case of the developed ones there was an opposite situation [6]. Furthermore, the share of exports in GDP is significantly smaller in the case of the developing countries, compared to the developed ones.

This can be explained by the much bigger size of GDP in the developed countries, by the big size of the local markets of those countries and by the necessity of the developing countries to export a lot in order to buy high technology elements, necessary in the modernization of their economies; and that is due to the fact that the prices of high-tech products and of products incorporating knowledge are much higher than those of primary products. If the export product prices decrease, follows the necessity to raise the amount of exports, in order to keep consistent the export incomes. If these prices decrease compared to the prices of the imported products, an increase of export will be necessary to keep a

consistent import, which is a significant economic effort that the emergent economies make with a view to reducing their trade deficit.

The participation in the international trade represents an important stimulus for economic growth. The experience of countries like Brazil, South Korea, Mexico, Taiwan, etc. demonstrates it. The access on the markets of developed countries can stimulate the more intense utilization of labor and capital resources of some developing countries. Where favorable opportunities of international exchanges appear, trade proves to be a stimulating factor of economic growth, in the sense provided by the traditional economic theory. Yet, the rapid growth of GDP does not necessarily represent the improvement of the situation of economic development. Progresses in the direction of economic development also depend upon the nature of the exported goods, on the way in which are distributed the benefits resulted from export, on the rest of the economy, and above all on the share of knowledge incorporated in the product. Presently, knowledge makes the difference on the market and represents the main factor of effectiveness of the foreign trade activity.

Naturally, the problem of the size of exports and of the types of exports that should be promoted appears too: “the question is which should be the right balance between the sectors of the economy that work for the domestic market and those that work for the international markets” [7].

Exports play a fundamental role both in the organization of effective international exchanges, and in achievement of high rates of economic development and growth that the emergent economies want to have in order to change their status, of developing or weakly developed states. Achieving export products incorporating a high level of knowledge, stimulating exports and orienting them towards competitive, high quality products, varied in terms of range, being aware of the external demand and promoting products for exportation represent factors of impact on the economic development and growth.

The economic development and growth are obtained if the conditions of a modern technology are achieved, valorizing raw materials available and power as well as possible, and providing high quality products at low costs.

In the long run, the priority is to develop research and production in fields of high technology that determine technical progress and

knowledge, by the agency of which a superior valorization of raw materials is ensured in the emergent economies.

Making high technology products in a varied range and with low production expenses, though it influences the increase of the volume and efficiency of exports, should be completed with the capitalization of products on the external market in an advantageous way, in order to obtain an effective rise of export effectiveness. The most suggestive example in this direction is that of the states in Eastern Asia or the new industrialized countries (NICs), which registered a considerable success from the point of view of the knowledge-based modernization and industrialization, following the application of the demand pull-approach policies and the rejection of the technology push approach.

An analysis of the experience of economic development of the countries in Eastern and South-Eastern Asia allows us to introduce two necessary conditions for the export-oriented strategy to contribute in an effective way in the economic growth and development:

- the dynamics of the external demand should exceed that of domestic demand;
- the incomes obtained from export should exceed the level of incomes obtained from the production intended for the domestic market, which is possible in the case of the exports of products from the processing industry and in the case of dynamic investment activities.

## Conclusions

In full development of the knowledge-based society, quality has become, in many fields, the main factor of competitiveness, often conditioning, to a higher extent than prices, the level of effectiveness and the conclusion of transactions.

The improvement of quality by knowledge has become the main possibility to ensure the success of each economy apart, regardless of the category it is part of: a developed or emergent one. This assumes a general preoccupation for the improvement of the quality of products intended for export, without affecting the ones for the domestic market. The countries that do not respond this requirement will lose the positions they held on the

market for the benefit of those whose main objective is the development of the sphere of knowledge, with a stress upon concepts, theories, investments, research, production, education and instruction etc.

In order to achieve a varied range of goods for exportation, it is vital to valorize the creative capacity in economy, as this is able to determine the growth of product share. The high degree of procession of raw materials, the reduced energetic consumption, the high technical, ergonomic-esthetical and commercial characteristics ensure the efficiency of production for exportation, which leads to goods and services that are appreciated and demanded on the international markets, and therefore competitive ones.

The world market is characterized by the accentuation of competitiveness, as the big companies coming from developed countries, which we know as multinational companies, are the dominant ones [8]. Under these circumstances, the attempts of some emergent countries to imitate elements from the exportation pattern of the developed ones can only lead to failure. For this type of economies, the chance to get significant incomes from exportation is to make a high specificity offer, which should incorporate a high degree of knowledge.

## Acknowledgment

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## Analysis of Knowledge Management within Five Key Areas

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*Knowledge Management as a crucial factor impacts on organizational performance. It seems to be a lack of empirical studies that measure knowledge in high educational environments, especially in universities. The main purpose of this study was to identify and assess five pointers that contribute towards knowledge management in a university in Iran. The methodology involved both qualitative and quantitative research to evaluate knowledge management based on literature and personnel viewpoints in the university. Data from 101 participants were analyzed by using Kruskal-Wallis, and Mann-Whitney test. The instrument used was a structured research questionnaire on knowledge management.*

*The analysis showed that all five parameters had an effect on knowledge management. The results imply that the university is following a trend towards knowledge-orientation. Furthermore, there was a significant difference between two groups (lecturer and staff) perception. Its implication can also be beneficial to other universities that plan to highlight knowledge-oriented management.*

**Keywords:** Knowledge Management, Information Management, Evaluation Method, Five-Indicators

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## Introduction

A review of current business literature reveals that knowledge management (KM) has become a crucial factor in competitive environments. According to Bhatt [1], business and academic communities believe that the process of leveraging knowledge can provide an organization with long-term competitive advantages. Obviously, universities are no exception; they are centers for production and leveraging of knowledge. Islamic Azad University – Gachsaran Branch (IAU-G.B.), as a center of knowledge, wants to implement KM so that it can develop the potentialities and commitment of skilled employees through identifying methods for creating, recognizing, implementing, leveraging and distributing organizational knowledge. This would mean a KM emphasis on the creation, utilization and development of their collective intelligence [2].

This research initially focused on identifying assessment measures of KM and their strengths and weaknesses. This study then investigated the relationship between KM in the field of management and infrastructure of IAU-GB, its variables including the general management, the leadership style, strategic vision, internal processes, and human resources, as well as factors such as the type of the groups (lecturers and other staff), job levels, and gender (Figure 1). At the same time, the study aimed to clarify whether it is possible to provide strategies for making KM more effective. The research methodology used qualitative and quantitative methods. The aim of this research, using qualitative methods, was to address the following questions in a literature review:

- What measures are used to evaluate KM?
- What are the variables in KM evaluation?

And, qualitative methods based on a case study addressed two questions:

- What is the level of KM from the perspective of employees?
- Are there any significant differences between the two groups (lecturer and staff)?

The structure of the paper is as follows:

Section 2 presents an outline of the literature review in the form of a table (Table 1) that lists the researchers of KM. moreover in this section, a general evaluation of KM and the categorization of their metrics and variables. The methodology and the case study are described in Section 3. Finally, Sections

4 and 5 present a discussion, some concluding remarks and suggestions for universities regarding the implementation of KM.



**Figure 1:** A Conceptual Diagram of Five-Parameter Modeling of KM

## A Review Study of Knowledge management

In recent years, researchers have focused on KM and have attempted to support organizational knowledge, such as: Sommerville and Dalziel [3], Goffee and Jones [4], Hwang [5], Albers and Brewer [6], Goh [7], Fernandez et al. [8], Gumus [9], Kayakutlu and Buyukozkan [10], Wen [11], and so on. Hence, KM has been categorized according to the authors' different approaches (see Table 1).

## Assessing Knowledge Management

According to the literature, there are nine perspectives for KM measurement (Table 2). Mostafa Jafari et al. [55] identified 33 measurement methods of knowledge and intellectual capital. They classified them into four groups: direct intellectual capital, score card, marketing cost methods, and return on assets. Khadivar et al. [74] classified the studied measurement methods into three approaches (from an area-based perspective): knowledge

measurement in products and processes, measurement of knowledge value in internal organization, and measurement of organizational conditions based on KM processes.

Moreover, Chang and Wang [59] classified the measurement methods into seven approaches (from a factors-based perspective): employee traits, strategy factors, superintendent traits, audit and assessment, organizational culture, operating procedures, and information technology. In addition, Adli [76] proposed 4 key indicators (context, input, process and output indicators); Vlok [82] stated 14 dimensions in 3 process-based areas: background/structural factors, knowledge production and knowledge integration; and Wen [11] offered 5 criteria for KM: data, information, knowledge, wisdom, and Staff; and so on. As a result of the literature review of KM performance evaluation, we can classify some of these review findings into several perspectives (see Table 2).

**Table 1:** Different Approaches to KM

No	Issues	Resources
1	Study on theory and	[12- 36]
2	Relationship between KM	[1, 37- 45]
3	Competitive advantages of	[1, 2, 23, 25, 26, 33 59]
4	Categorization of KM	[29, 40, 61 -75]

## Knowledge Management in High Education

Knowledge systems are core elements of a manager’s requirements for organizing, controlling, participating, and combining systems of structures, processes, and people [35]. For this reason, many authors have studied the different facets of knowledge [33, 34, 36, 59, 83], but it seems that the creation and utilization of knowledge is the most important challenge.

Universities are the main centers for producing and leveraging knowledge [56]. Through the use of KM, universities will be able to perform more effectively by spreading knowledge among cultures, and expanding the process of learning and teaching to overseas universities [53].

Therefore, we need to establish what KM is and organize it into categories so that we can gain a conceptual understanding, and prepare the appropriate context for the creation of software concepts. Due to the appearance of new knowledge producers in the education sector, more and more universities are looking into the possibility of applying corporate KM systems [2]. In this case, there are some factors which affect the success of KM in a university: leadership, the nature of academic other staff, evidence of the benefits, the taxonomy for the application of KM within the university, management structure, and the history of the university [83]. Hijazi and Kelly [42] claim that KM can help to solve problems between industry and a university, such as: align IT with social networks and dealings, encourage and support the use of KM, allow knowledge transfer across different tasks, apply knowledge to workers' management and practice tacit knowledge within their surroundings. Abdullah et al. [81] proposed a framework for a KM system: psychological – motivation, awareness, reward, strategy; culture – truth, beliefs, value, experience; process – acquisition, store, disseminate, use; functionality – agent, email, video conferencing, chats; architecture – application, technology, infrastructure, repositories.

## Evaluating KM at Universities

Regarding KM in universities, Sar karani [53] focused on the challenges of Japan and the prerequisites for the internationalization of universities as well as their duties of producing knowledge and KM. Jamshidi and Nemati worked on 'knowledge share and experience' in social capital development within IT units in universities, and their results showed that there was a significant difference between the knowledge share process and social capital experience [84]. In this study, the indexes to evaluate the success of a KM system have been provided by a questionnaire. In this case, a combination of indexes was introduced in the questionnaire as suggested by Rampersad [85].

**Table 2: KM perspectives and metrics**

Perspective	Indicators / Metrics	N	Res
Analysis-based	<ul style="list-style-type: none"> <li>Qualitative analysis, quantitative analysis, non-financial indicator analysis, financial indicator analysis, internal performance analysis, external performance analysis, project-orientated analysis, organization-orientated analysis</li> </ul>	8	[36]
Area-based	<ul style="list-style-type: none"> <li>Knowledge measurement in products and processes, measurement of knowledge value in internal organization, measurement of organizational conditions based on KM processes</li> </ul>	3	[74]
Factors-based	<ul style="list-style-type: none"> <li>Employee traits, strategy factors, superintendent traits, audit and assessment, organizational culture, operating procedures, information technology</li> </ul>	6	[59]
Indicator-based	<ul style="list-style-type: none"> <li>Context indicator, input indicator, process indicator, output indicator</li> </ul>	5	[76]
	<ul style="list-style-type: none"> <li>Knowledge or information quality, perceived knowledge management system (KMS) benefits, user satisfaction, and system use were used as dependent variables in evaluating KMS success</li> </ul>	4	[43]
Method-based	<ul style="list-style-type: none"> <li>Marketing cost methods, return on assets, direct intellectual capital, score card</li> </ul>	4	[77]
	<ul style="list-style-type: none"> <li>The balanced score card, economic value-added, Skandia Business Navigator</li> </ul>	3	[78]
	<ul style="list-style-type: none"> <li>Direct intellectual capital, score card, marketing cost methods, return on assets</li> </ul>	4	[73]

Metrics-based	<ul style="list-style-type: none"> <li>Benchmarking focus, performance measurement focus, Skandia Business Navigator, value focus</li> </ul>	4	[79]
Model-based	<ul style="list-style-type: none"> <li>Cognitive model, network model, community model, quantum model, philosophy-based model, general intellectual capital (IC) measurement model</li> </ul>	6	[57, 71]
Parameters-based	<ul style="list-style-type: none"> <li>General management, leadership style, strategic vision, internal process, human resources</li> </ul>	5	[80]
	<ul style="list-style-type: none"> <li>Psychological, culture, process, functionality, architecture</li> </ul>	5	[81]
	<ul style="list-style-type: none"> <li>Technology, process, people</li> </ul>	3	[57]
	<ul style="list-style-type: none"> <li>People, structures and processes</li> </ul>	3	[35]
Process-based	<ul style="list-style-type: none"> <li>Knowledge creation, knowledge validation, knowledge presentation, knowledge distribution, and knowledge application activities, knowledge capitalization, knowledge balancing</li> </ul>	6	[1]
	<ul style="list-style-type: none"> <li>Background/structural factors, knowledge production, knowledge integration</li> </ul>	3	[82]
	<ul style="list-style-type: none"> <li>Knowledge creation, knowledge accumulation, knowledge sharing, knowledge utilization, knowledge internalization</li> </ul>	4	[75]
	<ul style="list-style-type: none"> <li>KM process (knowledge acquisition, knowledge conversion, knowledge application and knowledge protection), KM effectiveness (individual-level and organizational-level KM effectiveness) and socio-technical support (organizational support and information technology diffusion) based on the previous literature</li> </ul>	3	[30]

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## The Specific Research Questions

The research questions of the study were as follows:

- What is the level of KM based on the main parameters at this university?
- Is there a significant difference between demographic factors such as: groups of the study (lecturer and other staff), job levels, and KM?
- How can KM be practiced at this university?
- How should the strategies be provided for enhancing effectiveness of KM in IAU-GB?

## The Research Methodology

This study was based on a survey that involved all the lecturers and other staff of IAU-GB. The population was 135 and the Kokaran model of sampling was used. Data obtained from the sample 101 participants were analyzed. In this study, descriptive statistics methods such as percentage, mean and so on were used, and depending on the type of variable, Kruskal-Wallis test, Mann-Whitney and correlation coefficient tests were applied for investigating the correlation.

### Research Hypotheses:

1. There is a relationship between an adequate 'general status of management' and KM.
2. There is a relationship between leadership style at IAU-GB and KM.
3. The more a university follows proper strategic outlooks, the more easily KM is achieved.
4. The internal management procedures at IAU-GB help establishes KM.
5. There is a relationship between the status of human resources and KM.

To test these hypotheses, KM was defined on 5 parameters. Then, due to the fact that the data were of ordinal scale, non-parametric Kruskal-Wallis Test was applied to obtain the mean of the 4 groups in every 5 variables of KM. All the hypotheses were tested and are summarized in

Table 8. Of course, with regard to the ordinal mean in each of the 4 groups in all 5 management parameters, it can be concluded that the more the means of the parameters are, the more easily KM is achieved.

### Participants

Questionnaires were sent to employees with positions of significant responsibility to measure the level of KM. 120 lecturers and other staff were selected through stratified random sampling and investigated through a standardized instrument designed by the researchers for management of knowledge. The collected data was analyzed using SPSS. The Kruskal-Wallis test, Mann-Whitney test and Spearman correlation tests were also applied. From 120 questionnaires distributed, 101 employees completed and returned their questionnaires, resulting in 101 (47 other staff and 54 lecturers) usable responses (see Table 3).

**Table 3: A Demographics Frequency of Participants**

Demographics	Gender		Field study			Job groups		Job levels				
	Male	Female	Human sciences	Basic sciences	Engineering	Staff	Lecturer	Manager	Expert	Lecturer		
										M S	Ph D-stu	Ph D
No	68	33	62	14	25	47	54	15	32	25	10	19
%	67.3	32.7	61.4	13.9	24.8	46.5	53.5	14.9	31.7	24.8	9.9	18.8

## Sampling Design

Five sets of measures were adopted and used to measure each of the five constructs, namely, general management, leadership style, strategic vision, internal process and human resources. These measures were made by integrating Rampersad test [85], and were subjected to a formal pre-test by some managers and experts.

An internal consistency analysis was performed separately for each variable in the theorized model by calculating the Cronbach's alpha. The results in Table 4 show that the Cronbach- $\alpha$ s for all the variables in the model were above the critical value of 0.7 [86]. Hence, the authors concluded that all the items had been appropriately assigned to each variable. The instrument developed also had content validity, because the selection of measurement items was based on an exhaustive review of the literature and a detailed evaluation by academics and practitioners. Content validity depends on how well the researchers created the measurement items to cover the content domain of the variable being measured [86]. The study used a five-point rating scale, i.e. from 1 (strongly disagree) to 5 (strongly agree). The reliability alphas ( $\alpha$ ) of different variables and sample items for each variable are discussed as follows.

**Table 4:** Statistical Information

Parameter	No of Items	Cronbach's Alpha	Mean	Correlations	Sig
General Management	13	.77	38.454	.710**	.000
Leadership Style	7	.77	22.3335	.728**	.000
Strategic Vision	5	.79	15.3665	.736**	.021
Internal Process	7	.77	19.9206	.745**	.025
Human Resources	7	.83	19.7428	.785**	.001
KM Total	39	.90	23.1635		

## Findings of the Study

Correlation and validity of the instrument’s statements were achieved through the Cronbach method, the correlation for all the subscales of KM were high and significant at 0.01, but note the correlation for the indicators of human resources in the first rank ( $r=0.785$ ), and general management ( $r= 0.710$ ) is last rank (see Table 4).

Also, the maximum Cronbach belongs to human resources (.83) and among the indicators, general management, leadership, and internal process are least (0.77), and strategic vision is .79. Fortunately, the reliability alphas of Total KM (0.90) were very strong, and the alpha value of 90% indicates that the research instrument has a high validity.

## Description of Data

Table 5 shows Mean, SD, Skewness and Kurtosis of 5 parameters: general management, leadership style, strategic vision, internal process, human resources and total of KM.

**Table 5:** Descriptive Statistics

Five Parameters	N	Mean	Std. Deviation	Skewness		Kurtosis	
				Statistic	Std. Error	Statistic	Std. Error
General Management	101	2.9580	.42427	-.032	.240	-.935	.476
Leadership Style	101	3.1905	.61714	-.289	.240	-.949	.476
Strategic Vision	101	3.0733	.59513	.082	.240	-.444	.476
Internal Processes	101	2.8458	.51968	.031	.240	-.388	.476
HUMAN RESOURCES	101	2.8204	.71419	-.213	.240	-.871	.476

The total KM scores of the participants are illustrated in the form of a histogram and a normality distribution in Figure 2. In fact, the normality distribution of the assessed variables was based on Kurtosis and Skewness (Table 5), the result of exploratory analysis showed an excellent normality KM scale.

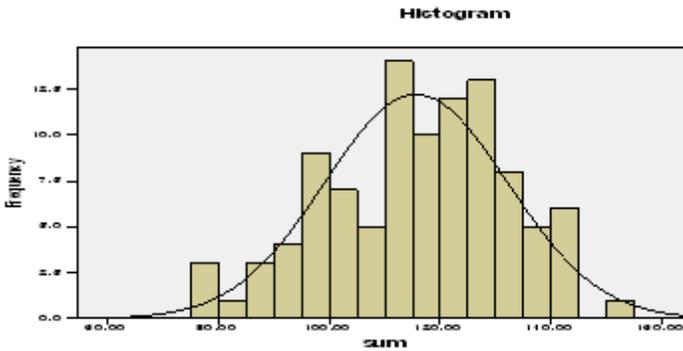


Figure 2: Normal Distribution

## The Score of Parameters

As can be seen in Table 6, the means of the parameters of other staff, lecturers, and total participants, are different. They are discussed below:

- Staff – The total mean of the 5 parameters that were indicative of KM was 2.73, and the highest mean belonged to strategic vision (2.93) and the lowest mean was 2.40 for human resources.
- Lecturers – The total mean for the 5 parameters measuring KM was 3.19, which is more than the average score. The highest mean was 3.46 and belonged to leadership style, and the lowest mean (3.04), belonged to internal process.
- Other staff and lecturers – The total mean of 5 parameters was 2.98. The parameter for leadership style had a high mean of 3.19. The mean for the parameter of internal process was lower than average (2.82).

In general, the respondents level of leadership style and strategic vision is more than average, in other words, they are satisfied with the system aspect of leadership style and strategic vision. However responses to

the other parameters (general management, internal process, and human resources) are less than average.

**Table 6:** An Analytical Survey of parameters

Parameter		General management	Leadership style	Strategic Vision	Internal process	Human resources	Total mean
mean	staff	2.8156	2.8845	2.9277	2.6201	2.4012	2.73
	Lecturer	3.0820	3.4568	3.2000	3.0423	3.1852	3.19
Total mean		2.9580	3.1905	3.0733	2.8458	2.8204	2.976

## Data Analysis

The main objective of this research was to identify and investigate the pattern for establishing a KM at university. In the other words, this research sought the answer whether there are any signs observed at the University of knowledge-based Management and how can this new and efficient pattern be implemented or strengthened at the university?

The minor objectives of the study included studying the demographic features of gender, age, education, and the groups of the study (lecturer and staff) as well as studying the parameters of knowledge-based management such as the general style of management at university, the leadership style, the strategic vision, the internal processes of management, and investigating the status of human resources at university.

According to the results shown in Table 7, there are significant differences between the approach of other staff and lecturers to KM parameters. In addition, the ranges of SD in measures show differences between the two groups. It seems the approach of lecturers were concentrated. So, it was assessed that lecturers had a more positive approach because they have more information and deeper/wider vision.

**Table 7: Mann-Whitney Test – Group Statistics**

Items	Position	N	Mean	SD
General management	staff	47	40.84	.34881
	Lecturer	54	59.84	.44765
Leadership style	staff	47	36.54	.56646
	Lecturer	54	63.58	.53368
Strategic vision	staff	47	43.67	.52985
	Lecturer	54	57.38	.62405
Internal process	staff	47	37.65	.45788
	Lecturer	54	62.62	.49302
Human resources	staff	47	33.85	.61599
	Lecturer	54	65.93	.58451

According to the results of the Kruskal-Wallis Test in which the significance value is less than 0.05, the null hypothesis that there is no relationship between these 5 parameters and KM is rejected and all 5 parameters are proved to have a direct positive relationship with KM (Table 8).

**Table 8: Kruskal-Wallis Test**

	General	Leadership Style	Strategic Vision	Internal Processes	Human Resources
Chi-Square	88.982	21.100	9.758	9.329	16.320
df	3	3	3	3	3
Asymp. Sig.	.000	.000	.021	.025	.001

## Hypothesis Test

### H-1, There is a relationship between gender and KM

To test this hypothesis, a non-parametric Mann-Whitney Test, needs to be conducted for two independent male and female groups:

Table 9 shows the results of tests and allows comparison of the means for female and male groups in 5 management parameters. Because the significance is <0.05 the null hypothesis is rejected and there is a significant difference observed between female and male groups. As can be seen, only for general management and strategic outlook parameters were there no meaningful differences between male and female groups. However, there was a significant relationship between gender and other parameters of KM.

**Table 9: Mann-Whitney Test**

Test Statistics <sup>a</sup>					
	GENERAL	LEADERSHIP STYLE	STRATEGIC VISION	INTERNAL PROCESSES	HUMAN RESOURCES
Mann-Whitney U	882.000	785.000	906.000	737.000	630.500
Wilcoxon W	3228.000	3131.000	3252.000	3083.000	2976.500
Z	-1.741	-2.448	-1.572	-2.803	-3.566
Asymp. Sig. (2-tailed)	.082	.014	.116	.005	.000

a. Grouping Variable: sex

### H-2, There is a meaningful relationship between groups of the study (staff and lecturers)

To test this hypothesis, a non-parametric mean for two independent groups (the other staff and lecturers) should be applied. Because the questions were of ordinal scale, non-parametric tests for ordinal data should be conducted. In this study, a non-parametric Mann-Whitney Test was used (Table 10). This test is intended to identify whether KM is identical for the groups of lecturers and the other staff.

**Table 10: Mann-Whitney Test**

	GENERAL	LEADERSHIP STYLE	STRATEGIC VISION	INTERNAL PROCESSES	HUMAN RESOURCES
Mann-Whitney U	791.500	589.500	924.500	641.500	463.000
Wilcoxon W	1919.500	1717.500	2052.500	1769.500	1591.000
Z	-3.258	-4.641	-2.358	-4.296	-5.499
Asymp. Sig. (2-tailed)	.001	.000	.018	.000	.000

a Grouping Variable: job

The above table tests and compares the means for 5 parameters of KM in the two groups: lecturers and other staff. Because the significance is <0.05 the null hypothesis is rejected and this shows that there is a significant difference between the two different groups of employees. As observed, there is a significant difference between two groups of employees in all 5 parameters of KM.

**H-3, There is a relationship between groups of employees and KM**

The means of the 5 management parameters in 5 groups of employees are compared in Table 11. Due to the ordinal nature of data, a non-parametric Kruskal-Wallis Test was implemented. The degree of confidence was less than 0.05 and this implies rejection of the null hypothesis. As observed, there was no significant difference found between the means of groups except for the strategic outlook parameter; however, there was a meaningful difference reported for all the remaining parameters in KM.

**Table 11: Kruskal-Wallis Test**

<b>Test Statistics<sup>a,b</sup></b>					
	GENERAL	LEADERSHIP STYLE	STRATEGIC VISION	INTERNAL PROCESSES	HUMAN RESOURCES
Chi-Square	15.204	23.560	8.147	21.537	30.989
df	4	4	4	4	4
Asymp. Sig.	.004	.000	.086	.000	.000

a. Kruskal Wallis Test

b. Grouping Variable: JobGroup

## Discussion

KM is an important strategy for improving performance and organization competitiveness [25, 26]. However, how to evaluate KM organizations has become one of the most crucial issues in KM [34]. The literature shows that most of the theories, research, and studies of KM are for determining indicators / parameters / metrics and methods of measurement, but hardly any effort has been applied to measure KM across a range of criteria.

As shown in Table 6, one of the main problems of the university is lack of procedure and suitable organizational structure to support internal processes. Wen [11] showed that “procedures, persons, supporting organizational structure and IT” are four key successes of KM. In addition, in a ranking by Wen [11], the priority of criteria was identified: information, staff, wisdom, knowledge and data. In our research, the lowest score was given to human resources (knowledge transfer, team working and performance assessment) and internal process (available knowledge, measure knowledge gaps, and exchange knowledge). Also, the least scores of other parameters are: Strategic vision: knowledge and performance in the corporate scorecard; Leadership style: identify and solve shared problems as a team, focus on developing employee knowledge; General management: network of knowledge employees, competition between colleagues. By contrast, the maximum of mean scores related to: effort directed toward improvement, learning by doing, committed top management to creating a learning organization, perception of knowledge important, customer information as strategically valuable, and knowledge exchange.

In addition, there are many problems regarding knowledge-based management, but the results show that leadership style is acceptable and the organization has the strategic vision to implement KM successfully.

Alhawary and Alnajjar's [45] findings indicated that there were no significant differences in the perception of academic staff at Jordanian universities for the use of information systems technology regarding the purpose of knowledge creation and conversion. By contrast, our research showed a significant difference in the perception of two groups (other staff and lecturers). Furthermore, the results of "Jamshidi and Nemati" showed a significant difference between knowledge share process and social capital experience. They also reported a significant difference between groups' aspects of knowledge share and social capital concept [84]. It seems that some of the problems were related to the history of the university (26 years) because there is a correlation between the history of the institution and its ability to respond to the challenges of the knowledge economy of the 21st century [83].

## Conclusion

With regard to the findings, in sum it can be stated that there are observable concrete indexes and evidences of KM in the fields of research, official, scientific, educational, digital facilities, at the university and they are increasing slowly. Also, from the point of view of the lecturers and other staff of the university under study, there have been advances in the parameters of KM especially in strategic vision and leadership style at the medium and above medium level. Indexes of internal process, human resources, and general management of KM have not been very successful in the research environment and have been evaluated to be weak. This calls for the principals of IAU-GB and other similar universities to take action. There was no significant relationship found between KM and variables of gender (with the exception of general management and strategic vision). However, there was a significant relationship between KM and groups (other staff and lecturers) of the study. Furthermore, there was a significant relationship between KM and job levels (with the exception of strategic vision).

When considering the combination of this qualitative and quantitative research, it seems that the total of O-KM was less than average,

but the trend of development of KM was suitable (26 years). Fortunately, leadership and strategic vision were above average, and the general management situation was about average. Therefore, it is proposed that internal process and human resources should be improved or be re-engineered.

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## Importance of Economic and Social Cohesion Policy for Romania

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*Cohesion Policy is one of the tangible examples of how it should be a European policy: modern, flexible, proactive, adaptable to rapid economic and social environment changing and having a substantial contribution to achieving the Union's key policy objectives, such as the Lisbon Agenda Cohesion Policy is one of the tangible examples of how it should be a European policy: modern, flexible, proactive, adaptable to rapid economic and social environment changing and having a substantial contribution to achieving the Union's key policy objectives, such as the Lisbon Agenda.*

*In the context of current debate on the future of cohesion policy, a reflection on this topic was initiated by the Romanian authorities, involving the most relevant institutions responsible for implementing cohesion policy in Romania and management of structural instruments. The analysis presented below reflects the first results of the consultation and reflection.*

**Keywords:** cohesion policy, economic cohesion, regional development, rural development, agricultural policy

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## Introduction

Convergence is evolving towards the achievement of certain targets. The process of each country to achieve this target may be different, but by adopting the *acquis communautaire*, the differences of perception and implementation of policies to reduce participating countries, and "common during" rush attenuation differences between states. Convergence can not be taken as an imposition. What proves to provide explanatory dimension is to analyze the convergence rate in the CEE countries as they advanced in terms of EU integration. This approach can be made by comparing trade development approach in a context of competitive structure and exogenous and endogenous pressures.

An obvious contrast is marked between convergence and convergence potential of CEE countries mechanically measured by GDP/capita. Some industries and areas of activity have rapidly converged towards EU standards development, but others do not. At the macroeconomic level, the more endogenous competitive pressure arising from the business, the higher the speed of convergence of CEE countries by GDP's / capita. The quality of institutions, reforms at the microeconomic level, making national environment, FDI, foreign trade and technology upgrades are all part of the story. Their improvement is essential if post-communist countries will address the catching up. Complex interplay between convergence speeds determining Romanian is untapped economic surprise, and reflects their studies. The argument for this approach is the need to give weight to the fact that a country's welfare or living standard is created at the microeconomic level, and interactions between growth and trade performance (competitiveness) in transition economies reveals the complex elements that provide for proper explanations actually different convergence speeds. Macroeconomic reforms, political, legal and social cannot succeed unless these capabilities are improving. Act made several comments regarding the 10 pillars of CEE countries to liberalize trade / growth / development of human relations in the context of EU integration. Greater convergence indicator Competitive neglected consider the convergence issues already mentioned and change overview convergence performance in CEE countries.

## The significance of economic convergence

The concept of convergence is seen by reducing the differences between various economic indicators of countries of a geographical area. Record the process of real economic convergence if poor countries recorded a higher growth rate of the richest countries, which reduce income differences between them. When the gap of economic growth increases, there is a process of economic divergence. Indicator to measure this concept is GDP per capita expressed in purchasing power parity. [5]

Combat territorial disparities and achieve a more balanced spatial structure of economic development requires coordination of development policies so that they are coherent and consistent. Modern debates about European economic convergence and divergence are closely related to configuration policies should strengthen regional cohesion.

The concept of territorial cohesion exceeds the notion of economic and social cohesion, a complete and enhances its significance. In political terms, the aim is to achieve balanced development by reducing existing disparities by preventing the rise of regional disparities, contributing to a higher consistency of sectoral policies with spatial impact and regional policy. Policies that promote economic, social and territorial cohesion are assessed by their effectiveness in reducing regional disparities in the provision of equal opportunities for individuals, irrespective of regions, countries in which they live. Therefore, the policy aims at ensuring regional and international convergence on this basis, achieving a convergence between Member States. Also, progress is measured by the specific instruments of economic convergence process, namely to reduce the dispersion of income between regions, the recovery gap between rich regions and the impact of structural funds and national public policies on the rate of growth. Consequently, EU cohesion policy is the tools that promote economic convergence.

Cohesion policy is a current compensation to ensure economic and social cohesion, but should also cover the promotion of endogenous development capacity of regions. This shift is due to the emphasis on regional development disparities as a result of evolution of integration amplification under the influence of globalization and expanding markets of the EU eastwards. Deficient developing regions tend to have competitive

disadvantages, which will not allow them to receive long-term accumulation of capital, technologies and positive externalities generated by the agglomeration of economic activities.

To recover the years lost in a system of thought or the economy, freedom and development, and affirmation of a nation in the European Union healthy, prosperous, educated, free and dignified, Romania's European integration process should be seen as contributing to development economic, to participate and competitive EU internal market. Economic development depends of the population's education level, not secondary, but tertiary level of education. In other words, the share of more educated people and a more qualified labor force could increase the welfare of a society, based on creativity, innovation, and labor flexibility. [2]

In current circumstances, the Romanian economy still faces structural problems serious enough, we need coherent and unitary aim programming, prioritizing and tracking national development policies. To ensure the funds necessary to implement these strategies, Romania, as EU member state, at present receiving financial assistance through its pre-accession instruments - PHARE programs current, ISPA and SAPARD - which were not completed during the Romania was a candidate. [1]

The main objectives envisaged by the European Union grants financial assistance through the Cohesion programs focus on: institutional development, investment to support the application of Community and investment in economic and social cohesion. Thus these objectives contribute to achieving permanent economic and social cohesion, the implementation of the *acquis* communitarian in the preparation and the preparation of the institutional mechanism for implementation of EU policies. To achieve the objectives are implemented measures that focus on functioning market economy and ability to cope with competitive pressure and market forces within the Union.

Projects financed by European funds are contributing to the development of less advanced areas, through investments for economic and social cohesion in key areas such as human resource development, local and regional infrastructure development, social services and tourism services. The purpose of these investments is to create jobs, increase competitiveness and improve quality of life for residents of the regions concerned.

With accession to the EU and therefore the Community principles of regional development policy, programs have been replaced by pre-accession structural instruments: European Development Fund, European Social Fund, Cohesion Fund, special allocations of funds for structural adjustment support fisheries and innovative actions and technical assistance. [4] Goals pursued by funding projects in these funds are mainly to promote sustainable development, balanced and harmonious economic and social whole Union, to ensure a better standard of living of EU citizens, of which Romania is part 1 January 2007.

An important aspect is that these funding opportunities from EU funds will be much higher than hitherto. According to financial programming in the period 2007 2009, Romania has benefited from grants, around four times higher than the pre-accession period, amounting to 5.973 billion Euros. Given this, it is necessary that the experience gained so far in the use of pre-accession programs to be used as a starting point for developing future management of structural instruments. However, we must also guided by the experiences of Eastern European countries that joined the European Union and who have experienced problems in the management and implementation of programs financed by structural funds.

Romania needs structural programs, both to catch up to existing EU member countries and for sustainable development. Structural funds that will finance regional policy measures must be managed and directed to allow close gaps between regions and not to deepen.

The National Development Plan, recovery tool for socio economic disparities of Romania to the EU priorities are geared to the objectives of structural instruments. National Development Plan objectives on competitiveness, knowledge-based economy, development and modernization of transport infrastructure, rural economic development and reduce development disparities between regions, achieved through structural instruments and correlated with the Lisbon objectives, can help local and regional social and economic development.

After analyzing the current economic situation and prospects in the short and medium term, we believe that among the main lines of action in regional and local development for the next period are: macroeconomic stability by meeting the convergence criteria, the integration of Romania

into the European Union; coherence and complementarities of economic policies, especially regional development policy by establishing levels of competitiveness; increase the absorption of EU funds in order to achieve the objectives of economic and social cohesion and reducing inter and intra regional disparities and the gap that separates our country from the developed States; development and national and transnational infrastructure, transport, environment, energy research and development; encourage retraining disadvantaged or affected by restructuring and support continuous improvement in work.

European funds can be used in the creation of poles of competitiveness by supporting business incubators for SMEs development sites (market access, competitiveness) and attracting investors. Given that regional diversity is high on the distribution of industries, addressing these poles of competitiveness must be distinguished from one region to another. Structural Funds allocation to the regions (particularly the European Regional Development Fund) will take into account the specific region, the competitive advantage of existing industries and encourage the development of competitiveness poles. Thus, it is necessary to ensure this consistent approach by all the levers that the state has available, the efficient allocation of resources and setting priorities.

## **The evolution of economic and social cohesion policy in Romania**

To increase efficiency in reducing disparities, countries and least developed regions should be the main beneficiaries of Cohesion Policy and therefore they should receive increased allocations in terms of support per capita. Cohesion policy should continue to provide its valuable support to the revised Lisbon Strategy targets. This policy has sufficient flexibility to finance innovative actions that lead to new patterns of development in Europe. However, Member States should retain the right to apply its own "recipe" in dealing with the Lisbon measures in accordance with their specific conditions. Cohesion Policy should help regions to succeed in global competition by developing their capacity to define and strengthen its strategic position to ensure successful competitive advantage, both at EU and global market. From this point of view, special attention needs to be

given to good governance (e.g. efficient use of public funds and public resources), economic development based on knowledge and continuous improvement of human capital. [5]

Regarding synergy with other policies Cohesion Policy and national community, we believe that cohesion policy can produce the expected effects only in combination with national and regional policies coherent and comprehensive. Cohesion policy cannot be successfully isolated from the rest of the policy implementation. In this sense, the integration of relevant national and Community policies in a coherent and well-founded concept that can provide the best value development potential of a country, region or area, would be essential. [4]

Simplify the implementation of the policy was one of the stated objectives for the period 2007 to 2013. Often, trying to simplify led to opposite results, giving rise to complications or simple replacement of existing rules with other rules, even more complicated than previous ones. Meanwhile, the EU's *acquis* and national legislation have become increasingly complex. Issues such as state aid, public procurement, environmental impact, complex procedures and technical standards, raises difficulties in the projects and often creates delays in implementation (in the context of the "automatic disengagement").

Cohesion policy is beneficial not only for the least developed countries and regions, but throughout the Union. More results can easily identify policy without which the most developed regions and Member States would not be able to and perfect the interests of the European Single Market, such as: Pan-European transport infrastructure development and thus improve spatial mobility, the movement of goods and labor, transfer of knowledge and new technologies. In this context, it is necessary to reinforce and increase awareness of the role of cohesion policy as a "political Europe". Also worth stressing that, beyond the obvious positive impact on the development of its Member States, regions and cities, this policy provides some of the most visible benefits for EU citizens.

## Cohesion Policy in Romania for the period 2007– 2013

Romania's regional development policy is a national policy that aims to reduce development disparities between regions and different parts of the country and prevent the emergence of new imbalances and thereby reducing development disparities between Romania, as a whole, and All other countries States. Romania's regional policy is reflected in the National Regional Development Fund, implemented as a priority in the National Development Plan 2007 2013. This strategy was developed on European principles, namely taking into account the development strategies of regions, drawn from broad regional partnership working. The overall aim is faster growth of less developed regions. This will be achieved through differential allocation of funds by region, depending on the degree of development that is inversely proportional to the GDP/capita, giving the priority to the regions lagging behind. Axes through which the regional strategy of Romania are:

- Axis 1: Improving regional and local infrastructure (construction or rehabilitation of 4,000 km of roads, 1,500 schools, 150 hospitals, 2015);
- Axis 2: Strengthening regional and local business environment (development of over 200 units to support business, directly supporting more than 1,500 micro-enterprises);
- Axis 3: Development of regional and local tourism (rehabilitation, 2015, 200 tourist and cultural sites and tourism contribution to GDP growth by 1.25%);
- Axis 4: Sustainable urban development (construction / rehabilitation of public spaces 400ha/km and implementation of integrated urban development projects 20, 2015);
- Axis 5: Promoting European territorial cooperation.

To get help from the EU, each state must develop a series of strategic documents of: National Development Plan 2007 2013, National Strategic Reference, Operational Programmes. OPs are documents approved by the European Commission to implement those priorities and sectoral / regional or national development plan are approved for funding by the National Strategic Reference. [3]

For the programming period 2007-2013, Romania drew 7 Operational Programmes under Objective "Convergence" (Competitiveness, Environment, Transport, regional development, human resources, administrative capacity development and technical assistance) and cooperate with neighboring countries and other Member States EU to develop other 7 Operational Programmes under Objective "European Territorial Cooperation". To finance POR 2007 - 2013 4030.77 million euros were allocated: Regional Development Fund (ERDF): EUR 3,275 million, representing 19.4% of total Structural and Cohesion Funds allocated to finance in Romania OP; national public funds: EUR 513 920 000; private funds: EUR 241 850 000.

## **Implementation of the Common Agricultural Policy in Romania**

The position of member of the Union, Romania has all the privileges due to a new Member State less developed economically (Union budget subsidies to various sectors of poor), but at the same time must also comply with common regulations. These viewpoints CAP no exception. Even before accession, Romania imposed the adoption and implementation of a series of specific legal rules and regulations of the European Union's *acquis communautaire* and implementation or restructuring of various key sectors (justice, military, industry, economy).

For the period 2007-2013, Ministry of Agriculture and Rural Development has created the National Program of Rural Development, aimed at investigating the current situation of Romanian agriculture to provide a final overview and to help draw up plans by which Romanian citizens will benefit from funds structural budget from the European Union. The plan shows Romania's willingness to fully implement Community legislation in the CAP, will establish the National Network for Rural Development in order to group national organizations and authorities involved in rural development. Its aims are to create an economy based on agricultural and forestry holdings must engage in modernization, promoting biodiversity and conservation, improve quality of life and economic development in rural area, improving local governance to develop and implement local development strategies. Also, beyond the opportunities

that Romania has in terms of European funding, regulatory framework applying a more stable and predictable due to the implementation of the CAP could have positive effects on price stabilization. Full capitalization of the advantages of Romania in the European Union could open new opportunities for Romanian farmers who can supply a market with a population exceeding 80 million. [1]

Although Romania has 14.7 million hectares of agricultural land, crops are poor and very vulnerable to weather excesses, while livestock farms is generally small. European Commission, referring to Romania said it would be necessary to the development of market infrastructure, to ensure market transparency and information on prices of agricultural products, and building larger households by leasing and selling land. The slow process of privatization of state farms are still a barrier to investment firm and effective exploitation of agricultural land.

A major problem for Romania is the rural development concept of vital importance for the future of the Romanian state, as specified in EU documents refer to rural development priority: improving processing and marketing structures for agricultural and fishery products, quality control, improvement of infrastructure rural and agricultural development and diversification of rural economy, harnessing human resources. [1]

## Conclusions

Romanian economy is still under the effect of industrial and agricultural era which produces products and services which hardly are competitive on the international and even on national markets. [6]

Correlated with the level of national development and the degree of development of community parameters of economic and social cohesion in Romania fourteen areas receiving funding through the Structural Funds and Cohesion: RTD, computerization of society, transport, energy, environmental protection and risk prevention; tourism, culture, urban regeneration and rural support for companies and entrepreneurs, access to stable employment, social inclusion for disadvantaged, human capital development, investment in social infrastructure, including health and education, promotion of partnership.

Funding process is legitimate support and monitors the actions undertaken, operational programs detailing funding areas that correspond to national and Community priorities. While respecting the eligibility criteria imposed by the three areas for action at Community level is necessary orientation of national development programs on two axes, as follows: thematic priorities - development of basic infrastructure to European standards, improving long-term competitiveness of the Romanian economy, development and efficient use of human capital; territorial priorities - promoting a balanced territorial development.

All these steps and actions that need to implement Romania, require the shaping of a national strategy for growth and development, to respond effectively to community needs in economic and social cohesion.

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## The Impact of the Industrial Sector on Romanian Employment

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*Through our study we aim to highlight the place and role of the Romanian industry in the national economy and its impact on employment in the last twenty years. Moreover, we intend to underline the regional gaps determined by the role and place of the industry at regional level. The results of our analysis carried out based on the statistical data between 1990 and 2009, show, on the one hand, the deindustrialization of the economy based on the reduction of the industry's contribution to GDP as well as to civil employment, and on the other hand, the negative impact that the industry's evolution had on employment. For the industry to generate new jobs and sustainable economic growth, we consider that it is necessary to turn our industry into a more efficient one and to increase its adaptability to the market's demands.*

*The results of this paper consist of original heterodox methods presented, intuitive or developed that can be found conclusively within the key proposals for education and regulation.*

**Keywords:** industry, employment, GDP, regional disparities, deindustrialization

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## Introduction

The industrial sector represents an important component of the national economy and it consists of those enterprises, which deal with the exploitation of natural resources and with their transformation or other raw materials (agricultural products, etc) into capital and consumer goods. From the point of view of the National Institute of Statistics of Romania [1], the industrial sector consists of the mining and quarrying industry, the manufacturing industry and the industry for production, distribution and supply of electricity, gas, steam and water, etc according to the classification of activities in the national economy (CANE Rev. 2).

Although the economic literature and practices show that an efficient sector of services, with a high level of quality, is a decisive factor for the sustainable economic development and competitiveness of modern economies, the industrial sector remains a major determinant of a country's economic performance. According to this, the industrial sector, especially the manufacturing industry has an important role in the economic development process [2] because:

- There is an empirical correlation between the degree of industrialization and income per capita.
- productivity is higher in the industrial sector than in the agricultural sector;
- The transfer of resources from manufacturing to services provides a structural change burden in the form of Baumol's disease. As the share of the service sector increases, aggregate per capita growth will tend to slow down.
- Compared to agriculture, the manufacturing sector offers special opportunities for capital accumulation in developing countries.
- The manufacturing sector offers special opportunities for economies of scale, which are less available in agriculture or services.
- Linkage and spillover effects are presumed to be stronger within manufacturing than within other sectors. Linkage and spillover effects between manufacturing and other sectors such as services or agriculture are also very powerful.

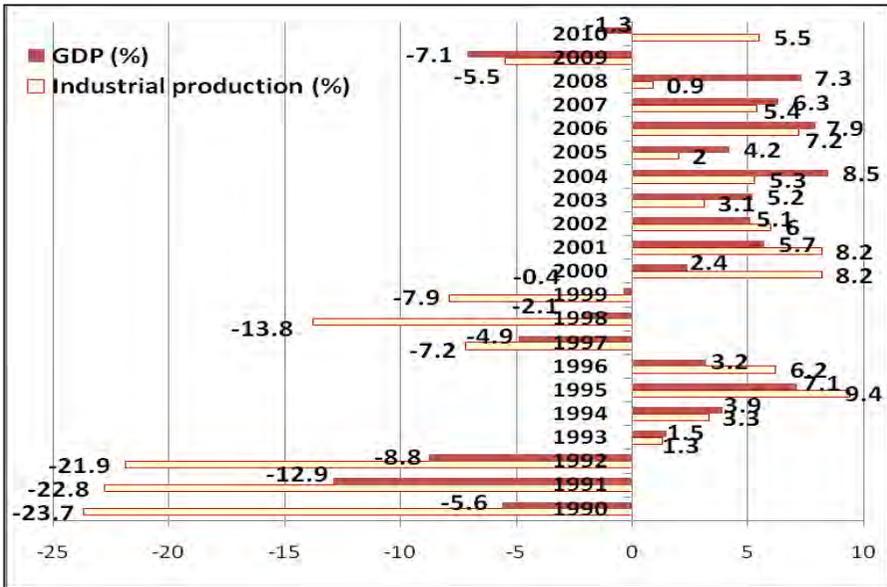
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## **The role of the Romanian industry in the process of economic growth**

Transition economies, including the Romanian economy, have inherited a deformed economic structure, where the forced development of the hard industry affected the increase in the services' sector and convenience goods' sector.

In the post-war period, the Romanian industry, being almost entirely state-owned and subordinated to the excessively centralized government, witnessed a preponderantly extensive development, marked by gaps between branches. The political events in December 1989 and the beginning of the transition process generated ample transformations among which also the change in the direction of evolution of the Romanian industry. Thus, after 1990 we witnessed a deindustrialization of the economy, by the reduction of the industry's contribution to the creation of gross domestic product (GDP), as well to employment.

The commerce and prices liberalization opened the way to resource reallocation and a change in the economic activity's structure on sectors, branches and domains, according to the market's needs. Under these circumstances, the industrial production in Romania recorded substantial reductions. Thus, in the first decade of transition to the market economy (1990-1999), the industrial production of the country recorded negative rhythms for 6 years, rhythms that varied between -4.9% (in 1997) and -23.7% (in 1990), being characterized by an amplitude far larger than the positive rhythms recorded between 1993 and 1996 (fig.1). Therefore, during the '90, the industrial production went far below the level recorded in 1989, reaching the minimum level in 1999, of 44% of the production recorded in 1989, according to data in fig.2.

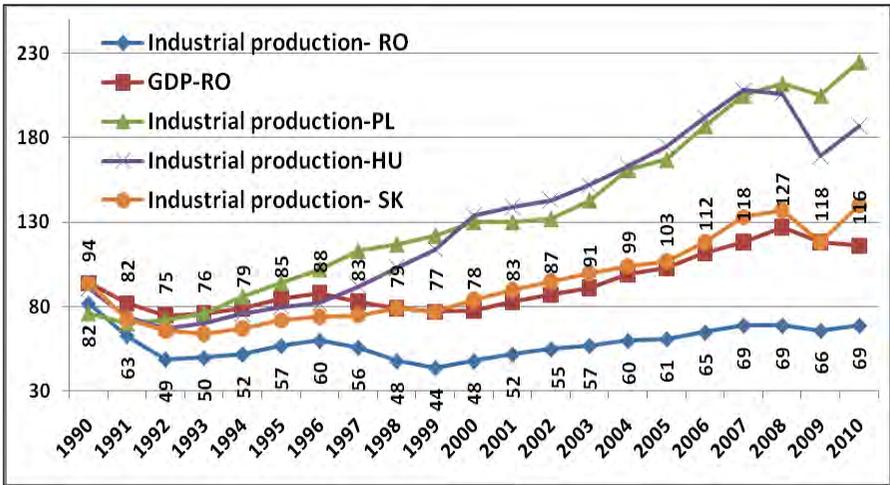


**Figure 1:** The annual evolution of industrial production and GDP

*Source: Based on the statistical data in [1] and [3-4]*

Although, in the following period (2000-2010), the industrial production recorded positive rhythms in ten out of eleven years (according to statistical data in fig.1), the industrial production in 2010 accounted for only 69% of the level achieved in 1989 (fig.2).

Countries such as Estonia, Hungary, Poland, Slovakia, managed, in 2010, to get an industrial production above the level achieved in 1989, precisely those countries that currently have a much higher development level compared to the one Romania has.



**Figure 2:** Evolution of industrial production and GDP (1989=100%)

*Source: Based on statistical data provided by [4]*

It results, from the comparative analysis of the data that reflects the evolution of industrial production and that of GDP in fig. 1 and 2, that the dynamics of industrial production significantly influenced the process of economic growth. The periods during which industrial production recorded negative rhythms coincide with the periods of economic recession (1990-1992, 1997-1999, 2009), and the periods during which the annual industrial production increased coincide with the periods of economic growth (1993-1996 and 2000-2008).

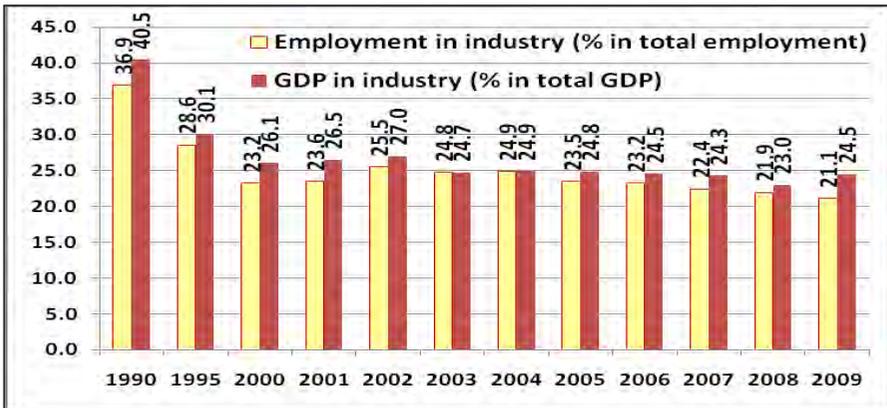
All these evolutions have determined a compression of the place of industry in the national economy.

## Deindustrialization and employment in the Romanian economy

The transition from the centralized economy to the market economy has generated significant modifications both in the economic structure and also regarding the sectors composition of the employed population [5].

As a result of the restructuring and privatization policies promoted in the field of industry, especially in the first decade of transition, the place

of industry in the Romanian economy diminished considerably if we take into account the fact that, in 2000, the industry’s share in total GDP reached the level of 26.1%, by 14.4 percentage points (p.p.) less than the specific share achieved in 1990, fact which underlines the progress of the deindustrialization process of Romania. In the same period, there was also a reduction in the share of jobs in industry in total jobs, from 36.9% to 23.2% (fig.3).



**Figure 3:** The contribution of industry to GDP and civil employment, In Romania, 1990-2009

Source: Own calculations based on data contained in [1]

In Romania, the strong direct correlation between the employment structure and the contribution of the employed population to the creation of the Gross domestic product, calculated using the Spearman correlation coefficient (of +0.938), allows us to state the following: the decrease in the share of employed population in industry of the total employed population by 15.8 p.p. (from 36.9% to 21.1%) determined, between 1990 and 2009, a decrease in the contribution of this sector by 16 p.p. (from 40.5% to 24.5%). The substantial reduction of the share of industry in GDP and employment may seem like a natural process of eliminating the consequences of a forced previous industrialization and one of taking Romania closer to the other European countries.

We mention that in 2010, according to data provided by Eurostat [6], the contribution of industry to the creation of gross value added (GVA)

was of 29.7%, our country ranking second among the UE-27 countries. The only country whose GVA share achieved in industry in total GVA is superior to the one obtained in Romania is the Czech Republic. As for the employment share in industry in total employment, Romania ranks third after the Czech Republic and Slovakia, according to data in fig. 4.

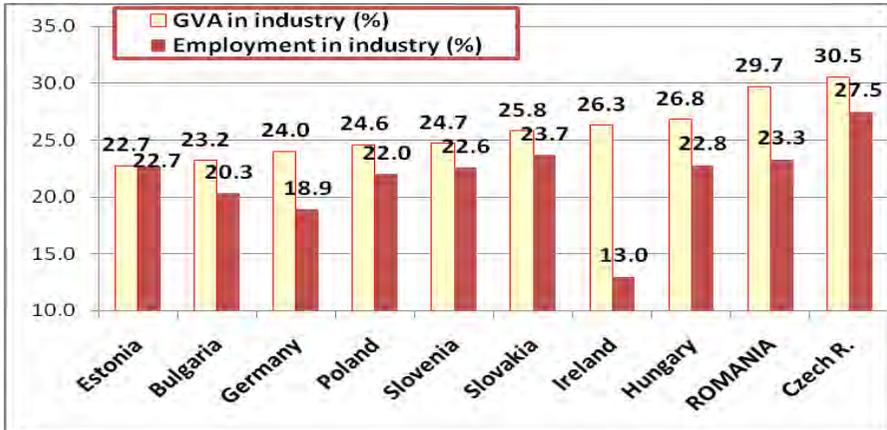


Figure 4: The contribution of industry to GVA and employment, In 10 EU countries, in 2010

Source: Own calculations based on data contained in [6]

It is worrying that after 1989 the employment share in industry decreased compared to the employment share in agriculture, having, after a decade, a difference of 16.8 p.p. between the two sectors, considering that, in 1999, jobs in agriculture accounted for 41.2% in total jobs, and the ones in industry accounted for only 24.4% (fig. 5). Such a tendency, in which employment is predominant in agriculture to the detriment of industry, marked the shift of our country from an industrial-agricultural profile to an agricultural-industrial one. At the same time, there was a growth tendency of the contribution of agriculture to GDP, accompanied by an accentuated decrease in the industry's contribution to GDP. In the next decade (2000-2009) there was an improvement in the between agriculture and industry, by the fact that the employment share in agriculture recorded a more accentuated decrease tendency, from 41.4% to 28.7%, compared to employment in industry, which dropped from 23.6% to 21.1%.

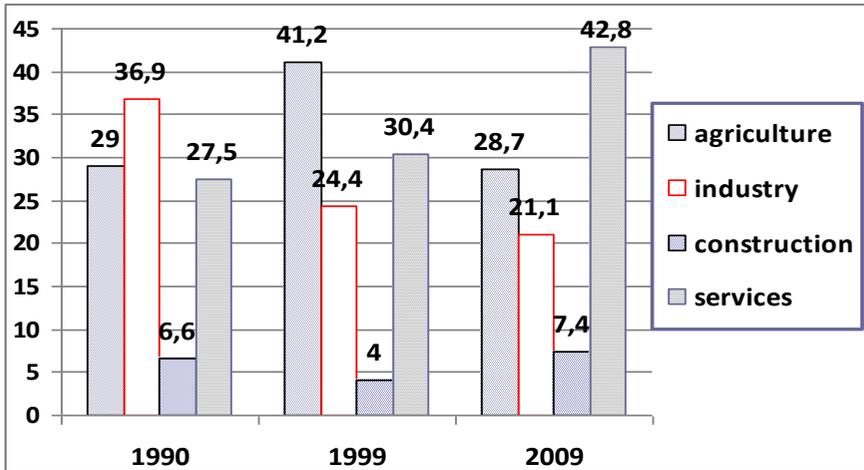


Figure 5: Civil employment structure, by economic activity (%), 1990-2009  
Source: Own calculations based on data contained in [1]

The fact that, in 2009, the employment share in industry was lower compared to the employment share in agriculture (21.1% compared to 28.7%) represents, on the one hand, the direct result of deindustrialization, and on the other hand, it indicates the fact that agriculture absorbed people laid off after the privatization of state enterprises in secondary sector, people came back to rural origins, with or without state compensatory payments. The consequence of this fact is found not only in the field of employment but also in the field of labor productivity, agro industrial produce competitiveness on the domestic market and EU's market.

As far as the relationship between employment in industry and employment in services is concerned, this suffered some changes during the last twenty years, meaning that employment in services increased from 27.5% to 42.8% between 1990 and 2009, and employment in industry decreased from 36.9% to 21.1%. The services sector in Romania proves to be the only sector where an increase of the employed population is registered. Between 1990 and 2009, 615 thousand jobs were created in the tertiary sector (the employed population in this sector increased from 2,985 thousands in 1990 to 3, 600 thousands in 2009).

All these changes in the employment sectoral structure determined Romania [6], in 2009, to hold the last place within the EU in terms of

employment in services (only 40.9%, as compared to 53% in Bulgaria, 55.9 in Poland, 58.5% in Slovenia, 70.4% the EU-27 average etc.). On the contrary, Romania held the first place in EU in terms of the share of employment in the primary sector (27.8%, compared to 19.9% in Bulgaria, 13.4% in Poland, 5.6% the EU-27 average etc.) and the fourth in terms of share of employment in the secondary sector-industry and construction (31.3% compared to 32.8% in Slovenia, 33% in Slovakia, 37.1% in Czech Republic, 24.1% the EU-27 average). We notice that our country is far from the European Union's values and even from some countries in Central and Eastern Europe [7].

The Romanian industry proved to be the biggest job loser after 1989. In the 1990-2009 period, the civil population employed in industry dropped from 4005 thousand persons to 1774 thousand persons (fig.6), which means a reduction of 2231 thousand persons of the employed population in this sector, compared to 1990, i.e. of 55.7%.

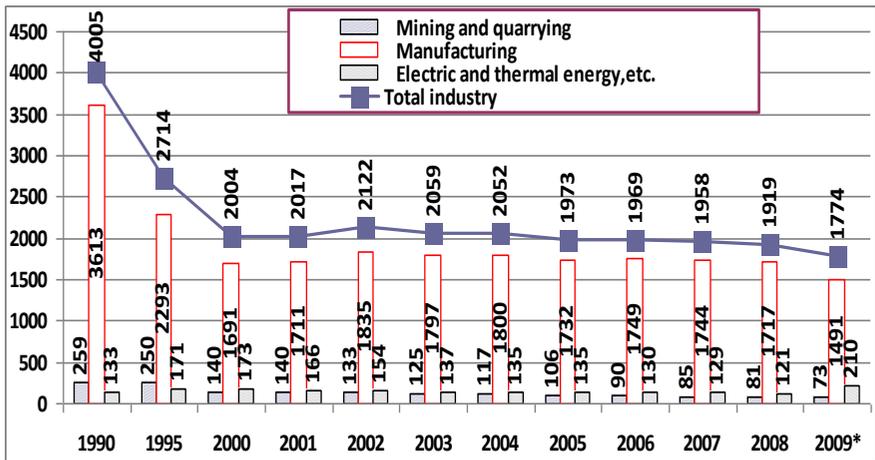


Figure 6: The evolution of the civil employed population in industry  
 Note: \*In 2009 the structure of production and employment in industry according to CANE rev. 2

Source: Based on data contained in [1]

During the same period, at the level of national economy, there was a reduction in the total civil employed population of 2429 thousands

persons, from 10,840 thousand persons to 8,411 thousand persons [1]. These figures suggest the fact that the loss of jobs at the level of national economy was caused up to 91.8% by the loss suffered in industry.

Data presented in fig. 6 shows the fact that the greatest job loss in this sector was recorded in the first decade of transition, when the number of jobs in industry decreased by 2,001 thousands, which accounts for 89.7% of the total jobs lost in the last 20 years.

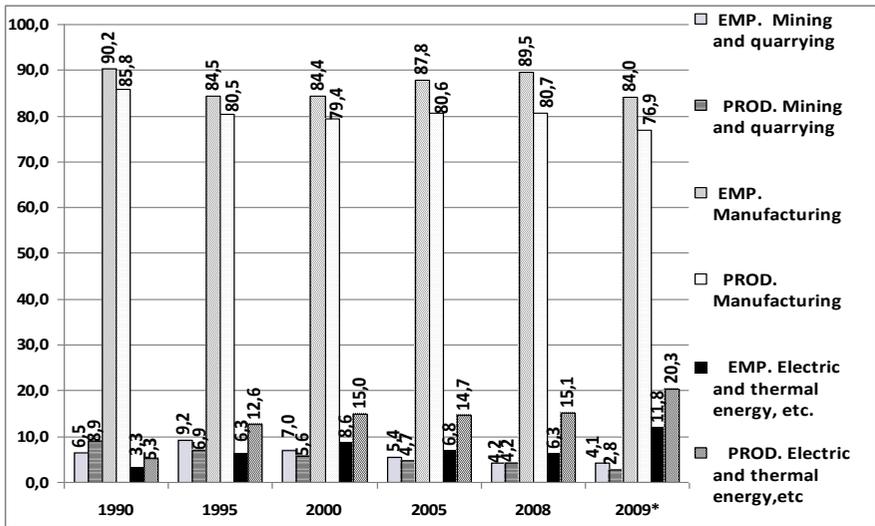
## **The structure of the Romanian industrial sector and employment**

From the analysis of the structure of the Romanian industrial sector, we notice that manufacturing has far the greatest share in total industrial production and this dominant role seems to have been constant over the last twenty years. In 2009 the manufacturing industry represented for the main component of the Romanian industry, covering approximately 77% of the industrial activity volume.

The structure of the Romanian industrial production in the 1990-2009 period, suffered some changes, through two main tendencies, presented in fig.7: on the one hand, the share of extractive industry dropped (by 6.1 p.p.) as well as the one of manufacturing industry (by 8.9 p.p.), and on the other hand, the share of electric and thermal energy, gas and water increased (by 15 p.p.). The share of 20.3% recorded, in 2009, by 5.2 p.p. higher compared to 2008, was caused also by the fact that in 2009, also the water supply; sewerage, waste management and decontamination activities were included in the activity of electric and thermal energy, gas and water according to the classification of activities in the national economy CANE rev. 2.

The changes we mentioned were generated by the different intensity of involution happening after 1989, in the three activities of industry, as well as by price liberalization, which generally took place to the detriment of the manufacturing industry and in favour of the other two activities [8]

Similar tendencies, but with a lower intensity, were shaped also in terms of employment in industry.



**Figure 7:** The relationship between the structure of industrial production and the structure of employment in industry

*Note:* \*In 2009, the structure of production and employment in industry is according to CANE rev. 2.

*Source:* Own calculations based on data contained in [1]

From the analysis of the statistical data presented in fig.7, for the 1990-2009 period, in terms of the structure of industrial production and the structure of employment in industry, we notice that the share of manufacturing industry in total production was inferior and declining compared to the share of the employed population in this sector of activity, fact which indicates a reduced and declining level of labor productivity. In mining and quarrying, except 1990, the relationship between production and employment was below one and decreasing, reflecting the drop in labor productivity in this activity.

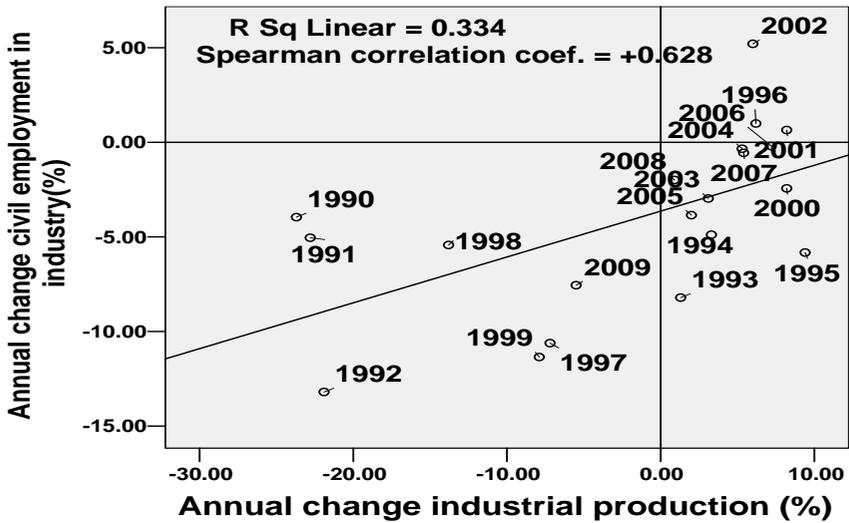
On the contrary, in the activity of electric and thermal energy, gas and water, etc, a growth in labor productivity has been recorded, if we take into account the fact that the relationships between the share of production and that of employment in this industrial activity is over one and increasing, according to data in fig.7.

The profound changes within the structure of the Romanian industry that took place in the last years have been influenced by the restrictions of the internal and external market, by the financial difficulties it was faced with and by the necessity of fulfilling the conditions of the functional market economy [9].

## **The negative impact of industry on employment**

The changes that took place in employment in industry were caused by a multitude of factors, which acted differently from one period to another. The main diminishing factor of the numbers of employees was the drastic reduction in industrial production compared to 1989 (fig.1 and fig.2), also the technical profile and nature of production contributed to this, to a certain extent. Thus, in the economic activities based on highly labor force consuming technologies, the reduction in the level of production had as result a higher decrease in the number of employees.

The results of the statistical analysis based on the Spearman correlation coefficient, carried out in order to establish the intensity of the relationship between the annual change in industrial production and employment in industry, highlights that in the 1990-2009 period, there was a direct correlation (Spearman correlation coefficient=+0.628) between the two variables: the drop in industrial production in Romania determined the decrease in employment in industry, according to data in fig. 8.



**Figure 8:** Direct correlation between annual change in industrial production and civil employment in industry

*Source: Own calculations based on data contained in [1]*

Despite losing an impressive number of jobs in industry in the two decades after the fall of communism, according to data provided by Eurostat [6], in Romania in 2010, the share of those employed in this activity, was at a higher level compared to the average recorded in UE-27 (of 16.3%), as well as compared to some of the east-European countries (Hungary, Bulgaria, Estonia, Lithuania, etc.), which had gone through the transition from the centralized economy to the market one. Only two countries of EU, (the Czech Republic and Slovakia) recorded higher shares of employment in industry than those in Romania (where 23.3% of jobs were created in industry), according to statistical data in fig.4. In these countries, the sector of services has almost doubled its share in total labor force, having positive consequences on labor productivity and economic development.

The decrease in employment in industry, both as number and share in total civil employed population, was caused mainly by the manufacturing industry, which, between 1990 and 2009, reduced the number of jobs by 52.48%, from 3613 thousands, in 1990, to 1491 thousands in 2009 (fig.6). In the first decade of transition to market economy, based on the

transformations that took place in the national economy, the manufacturing industry became the main job loser. Thus, statistical data in fig.6 shows that until 2000 this economic activity lost 1922 jobs, this tendency also continued in the 2001-2009 period, but with a lower intensity.

The shift from the centralized economy to the market one meant also a transformation in the structure of property, thus private property became predominant. Therefore, the general tendency among active enterprises was that of growth in the number of SMEs, according to data in table 1. Thus, in the 1992-2009 period, the number of SMEs in industry increased three times, and in the manufacturing industry 2.8 times. However the share of SMEs in industry in total SMEs decreased from 15.1% to 11.2%.

**Table 1:** Evolution of SME active in industry, 1992-2009

Indicators	1992	2009
<i>Total SMEs<sup>1</sup></i>	126549	517870
Total SMEs from industry	19067	57970
SMEs share in industry in total SMEs <sup>1</sup> (%)	15.1	11.2
Total SMEs in manufacturing	18924	53909
SMEs share in manufacturing from total SMEs in industry (%)	99.3	92.9

<sup>1</sup>*active small and medium enterprises in industry, construction, trade and other services*

*Source: Own calculations based on data contained in [1]*

Although SMEs are known for their ability to easily adapt to the market demands, under the circumstances in which the manufacturing industry owns over 90% of total SMEs in industry, we consider that Romania cannot have a competitive manufacturing industry, being known that these enterprises are sometimes in impossibility of assimilating and developing the modern technology, of applying a modern management. The

inefficiency of SMEs in the manufacturing industry can be revealed also by the inverse proportional relationship established between the evolution in the number of SMEs and the evolution of jobs: the number of jobs dropped by 52.48%, even if the number of SMEs grew by 184.9%.

Post-communist Romania inherited a structure of the manufacturing industry which is insufficiently correlated with the country's needs and resources, with integration possibilities in the labor division on a global scale. This is the reason why creating a modern market economy should have included, on a central position, the optimization of the manufacturing industry's structure. The restructuring and privatization policies promoted in the field of industry after 1989, didn't lead to improvement in the Romanian manufacturing industry's structure, but rather to its accentuated deterioration, and at the same time the country's deindustrialization took place.

The negative trend of jobs in the manufacturing industry only followed the trend of industrial production. The explanation for the reduction in the number of jobs in the manufacturing industry, in the first years of transition, is also based on the smaller subsidies that were provided by the state for the manufacturing industry.

The evolution of employment in industry was also influenced by the changes that took place in the extractive industry, where the restructuring of activity in mining had as result the reduction by 72% of the employed population (from 259 thousand persons to 73 thousand persons).

## **Regional disparities in the Romanian industry**

The deindustrialization of the Romanian economy is experienced also at regional level, by the deepening of the economic gaps at the level of development regions.

Romania, according to the Law on regional development (no.151/1998) is divided in eight development regions: Centre (C), West (W), South-East (SE), North-West (NW), North-East (NE), South-West Oltenia (SW), South-Muntenia (S) and Bucharest-Ilfov (B-I), which constitute the creation, implementation and evaluation framework of the regional development policy.

As compared to 1995, when the difference between the highest contribution of industry to regional GDP and the lower one was of 9.7 p.p., in 2009, this difference increased up to 13.9 p.p. (according to statistical data in table 2 and fig. 9), fact which reflects the increase in regional disparities, having a negative impact on the level of economic development. If in 1995, four out of eight regions (South-Muntenia, Center, South-East and West respectively) recorded a level of GDP/capita (indicator that reflects the level of economic development) above the national average, in 2009, only two regions, Bucharest-Ilfov and West respectively, managed to obtain a higher GDP/capita compared to the national average, according to data presented in table 2.

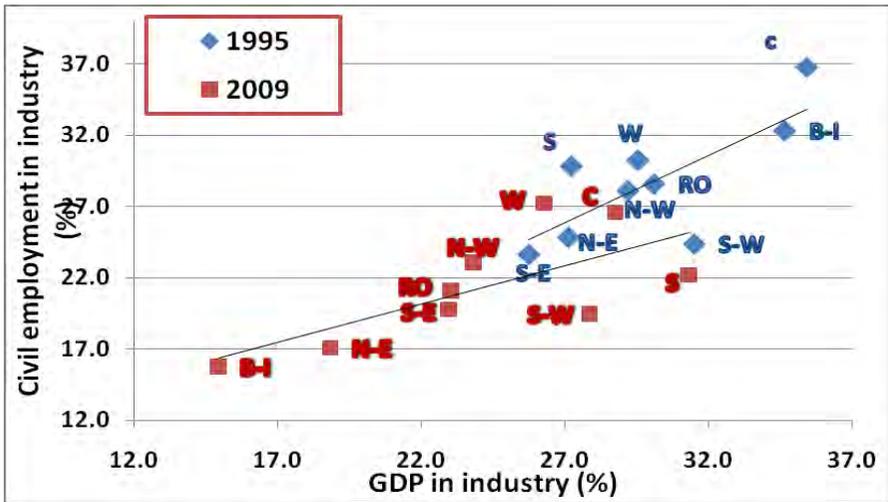
**Table 2:** Evolution of the employment (EMP.) in industry (%), GDP in industry (%) and GDP per capita (%), at regional level

	1995			2009		
	GDP	EMP.	GDP/capita	GDP <sup>1</sup>	EMP.	GDP/capita
Romania	30.1	28.6	100.0	23.0	21.1	100
North-West	29.2	28.1	93.7	23.8	23.1	89.8
Center	35.4	36.8	104.2	28.8	26.6	94.2
North-East	27.1	24.9	81.4	18.8	17.1	60.3
South-East	25.7	23.7	101.6	23.0	19.8	81.2
South-Muntenia	27.2	29.9	147.0	31.3	22.2	86.5
Bucharest-Ilfov	34.7	32.3	97.8	14.9	15.8	242.7
South-West Oltenia	31.5	24.4	85.2	27.9	19.5	76.3
West	29.5	30.3	101.0	26.3	27.2	109.1

Source: 12008; Own calculations based on data contained in [1] and [10]

The deepening tendency of regional gaps was also recorded in terms of share of employment in industry in total employment, even if this indicator, in 1995, recorded values between 24.4% and 36.8%, and in 2009, values between a more reduced interval (17.1% and 27.2%).

From the statistical analysis on the civil employment in industry and GDP in industry, it results that in the regions where employment in industry is high, the share of GDP in industry in total GDP is high, and vice versa (fig. 9). The value of the Spearman correlation coefficient of +0.667 for 1995 and +0.661 for 2009 shows that between the two indicators there is a statistically significant direct relationship. Moreover, data in fig. 9 reflects once again the deindustrialization of the Romanian economy, in the 1995-2009 period.



**Figure 9:** Direct correlation between civil employment in industry and GDP in industry, at regional level

*Source: Own calculations based on data contained in the table 2*

The drop in the contribution of industry to GDP and job creation, at regional level, in the 1995-2009 period, did nothing else but to follow the tendency recorded at the level of national economy. The only region, where the share of regional GDP created in industry in total regional GDP increased in 2008 compared to 1995, was the South-Muntenia region, the one which in 2008 held the first place, compared to the last but one place, in 1995, regarding this aspect.

The most significant changes are recorded in the Bucharest-Ilfov and Northeast regions. Thus, in the Bucharest-Ilfov region, there was a

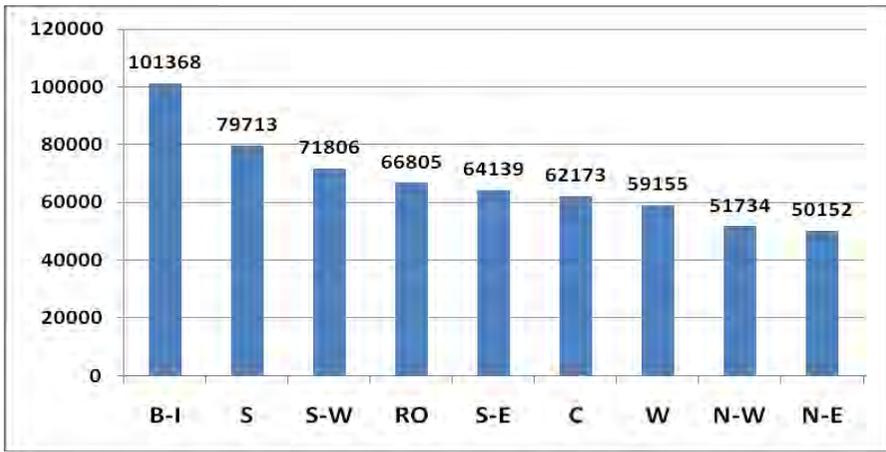
compression of the role of industry, caused by the reduction by over 50% of the industry's contribution to GDP and employment creation. At the same time, we notice a spectacular growth in GDP per capita from 97.8%, in 1995, to 242.7%, in 2009 (compared to the national average of 100%), but also in the role of the services sector. The services sector represents the main provider of jobs in the Bucharest-Ilfov region, where the share of employment in services is of 73.3%, a lot above the national average of 40.9% [1]. The distance between the Bucharest-Ilfov region and the other regions, from the point of view of the share of civil employed population in services, is due to the rapid growth of the sector of businesses in services, the relatively high rate of attendance in higher education, a factor which supports the growth of services [11].

In contrast to the Bucharest-Ilfov region, where there was a compression of the role of industry in favor of services, in the Northeast region, the diminishing of the role of industry was followed by the increase in importance of the primary sector. We mention that in this region the highest share of employment in agriculture is recorded of (48.2%), but also the most reduced employment in services (31.1%). Due to the fact that the North-East region is marked by its dependence on agriculture and a high level of ruralisation as well as by the proximity to the border with Moldova and Ukraine, in 2009, it was characterized by the lowest level of development, with a GDP/capita of only 60.3% of the average at the level of national economy.

In the 1995-2009 periods, there were significant changes in terms of the hierarchy of regions according to the specific share of industry in regional employment. If, in 1995, the first three places were held by the Centre, Bucharest-Ilfov si South-West Oltenia regions, in 2009, the first place was held by the West region, followed by the Centre and North-West regions. Benefiting from their closer position to the western markets and their more reduced dependence on the primary sector, West, North-West and Centre regions have attracted more foreign investors, fact which has significantly contributed to their development.

If we analyze the contribution of industry to regional GDP compared to the contribution of industry to civil employed population, we notice that in some regions the contribution to GDP is higher compared to the contribution to civil employment and vice versa. The regions in the first

category (South-Muntenia, South-West Oltenia), where the relationship between the contribution to GDP and the contribution to employment is higher than one and as high as possible, are characterized by a higher labour productivity compared to the other regions where the relationship is below one, according to fig. 10 and table 2.



**Figure 10:** Labour productivity in industry (lei/employed person), at regional level, 2009

*Source: Own calculations based on data from [1] and [10]*

An important indicator for the gaps existing between regions is labor productivity in industry, calculated as the relationship between gross value added and civil employed population. According to data presented in figure 10, a worker in the industry of the B-I region (where there is the highest productivity) obtains a gross value added two times higher than a worker in the North-East region, the one with the lowest level of economic development and the lowest labor productivity in industry, there being a relative gap between the regions with extreme values of 2/1.

In order to diminish and even eliminate the economic discrepancies between different regions, it is necessary to promote some measures that should aim to adequately develop the industry at territorial level.

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## Conclusions

The results of our analysis carried out based on the statistical data in the 1990-2009 period in terms of the place and role of the Romanian industry in national economy and its impact on the employment highlight the following most important aspects:

- The deindustrialization of the economy through the decrease in the industry's contribution to GDP as well as to civil employment;
- The existence of a direct relationship between the evolution of industrial production and the evolution of employment, thus the reduction in industrial production determined the reduction in employment;
- The reduction of employment in industry, especially in manufacturing industry, had a negative impact on the relation between employment in industry and employment in agriculture, with negative consequences on economic development;
- The incapacity of the services sector to generate jobs, so that the losses suffered in the industrial sector, in terms of employment to be significantly diminished or even eliminated. The problem is not only the reduction in industry, as share to GDP and also as share to employment, but rather the fact that agriculture was the one to absorb the people made redundant after the privatization of state-owned enterprises in industry and not the tertiary sector.
- The existence and deepening of regional gaps in terms of the place and role of industry in the economic development process.

So as for the industry to generate jobs and sustainable economic growth we consider that it is necessary to develop an open and flexible industrial system, compatible with the European structures, with a real competitiveness and adaptability capacity to the demands of the national and international market.

## Acknowledgements

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## Current Challenges and Opportunities of System Modeling for Hospital Automation

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*This paper is focusing on the System Modeling for Hospital Automation, its challenges and opportunities. System modeling is mean to convert requirement analysis to system/specification. It shows the way of direction of how to use the system with effective way. It helps to understand system easier and builds the link among different activities and its impact. System modeling can trace out the problem area and after analyzing, it shows and determined the expected model, which could be more appropriate to implement for any organization, hospital as well as various types of business institutions. So the objective of this paper is to come across the system modeling for “Hospital Automation” and to find out the solution by analyzing with few methods. So this paper will discuss the domain scope for hospital, Software development life cycle, object oriented, function oriented and agent based software development methodology. It focuses also the requirement engineering. And finally also maps out the Jackson approach as well as VORD method for implement these approaches for Hospital Automation to meet the current challenges and accept the opportunities.*

**Keywords:** System Modeling, Hospital Automation, Software Development Life Cycle, VORD method

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## Introduction

Hospital is a large social organization, which provides the health care service to the society. It deals with the human life what is a very sensitive and serious issue. Hospital is a complex system, which is not manageable in a simple method. It has Doctors and Nurses (the employees), Patients (customers), Board of directors (authority), Payment section and Payroll (finance division), security and many other divisions. Hospital provides the Medical treatments (service) to their patients through consultancies and prescriptions. In hospital, there are many categories and divisions in every sector. The Doctors are categorized according to their specialty such as Surgery, Medicine, Cardiology, Dental, Dermatology, Orthopedic, Gynecology, Nose-Ear-Neck and Neurology. The Nurses, administrative officers, authority and finance divisions are also categorized in different levels.

As it has many components or entities that are closely interrelated, dependent and associated with each other, it's really very difficult to maintain the whole process in a very simple way. If any component does not work properly then other dependent components can be hampered. For example, in a hospital if nurse-scheduling, causes the conflict or low skilled nurses are scheduled for serious patient then patients and doctors suffer many undesirable problems.

In present, manual paper based record keeping system of the patient information in the large volume of books are inconvenient. It's not convenient and takes long time to find out a particular patient records and medical history. In manual system everything is paper based that is very hard to maintain the total process. Even staff scheduling for both the wards and the operation theatre is difficult and its may creates conflicts in the manual system.

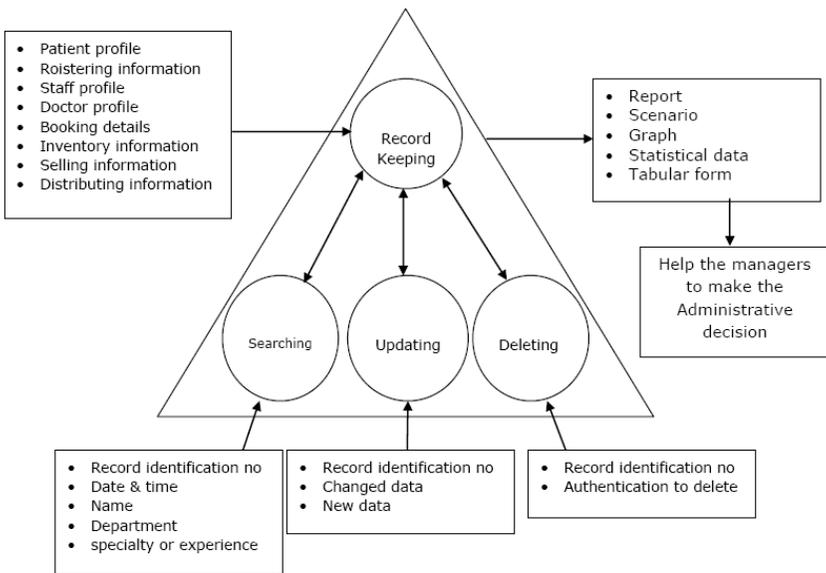
For the better management system of the hospital service, I believe, update of the computerized system is the best solution. The Database will contain all information about in-patients, outpatients, doctors, nurses, ambulance, Operation Theater, Ward/Cabin, medicine under a specific domain. In this system it's easy to add, change, or delete data from the database, correct information in time, accurate the billing system and easy payments for the better cash flow. Security is another important issue for

the hospital, which can also be, maintain by this system. Also, I would like to generate the reports of the total information about the doctors, nurses, the ward booking, the ambulance and the OT booking, admission of patients in a month, the financial condition of the hospital, particular patients bill, and other statistical reports. This information's are very important for the better hospital service.

So, I think, automation is absolutely needed for smooth functioning of the total process. It will be more time consuming and easily maintainable. To develop the total idea I am going to implement few models in this paper, which are effective for the hospital automation process.

**Domain area or domain scope:**

Now I would like to discuss about the domain area or scope, which I want to automate by the computerized system.



**Figure 1:** Our problem scope of a Hospital

The above Figure 1 illustrates the problem area of Hospital Automation. The input of the record keeping process of this manual system is patients profile, fostering information, staff profile, doctor profile, booking

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details, inventory information, selling information, distributing information, scheduling information. This process is completed manually in books.

The patient profile contains the particulars of the patient like identification number, patient's name, age, sex, Father/Husband name, contact address, blood group, the patients category (in-door or out-door) etc.

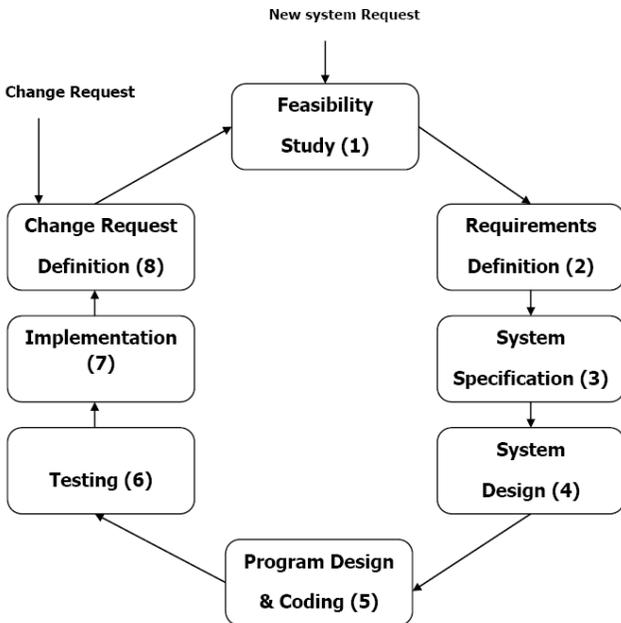
The contents of the doctor profile are the doctor recognition number, doctor's name, designation, contact address, contact number, department etc. The staff profiles are the combination of all information about a staff as like as a doctor profile. Here staffs include nurses, receptionist, matron, pathologist, pharmacist, medical officer. The inventory information are stored with inventory items id, name, price, quantity, and date of inventory i.e. purchase date, supplier. The inventory item includes the medicine, OT apparatus, scraps, Lab specific accessories, bed etc. The selling information is also having same data like inventory items like sold item id, item name, quantity, price, date of sale etc. In Fig-1, the searching process finds and shows the desired particular record by taking the record identification number or date & time. In the manual system it is too hard to show searching result successfully. Also, Fig-1 illustrates the updating process that can update a record by using identification number. Here the deleting process deletes the record from the database that is not required for further operation.

After completing these processes, some statistical data like number of patients admitted in a month, monthly income and expenditure, monthly medicine consumption, type of diseases and patients, number of empty wards and beds, monthly medicine and accessories stock etc. This paper will also represent this information by graph such as line graph, chart (pie chart or bar-chart) or by the graphical representation of data. These statistical data can help the managers, directors and executive directors to take proper administrative decision for quality service. The manual paper based system cannot provide these facilities so easily. Therefore, to develop the total system I have to take the system requirements, which is discussing in the next part.

### Methodology:

There are different types of methodology has been used for system modeling. Now a day's organization are forming and adapting for client oriented. So different types of system development or software development life cycle have been built or created to manage the complexity of the organization. „The term life cycle indicates the staged nature of the process“ (Avison& Fitzgerald 2003). Therefore, SDLC is a sort of methodology which builds the process of information system with a good structure. In this part I am going to discuss about the SDLC life cycle and different types of methodology like *Object Oriented Software Development Methodology*, *Function- Oriented Software Development Methodology* and *User oriented Software development methodology* and *Agent based Software development Methodology* (Ayodele, Oluyomi 2007). It will focus why these types of method have been taken for and its application.

### Software Development Life Cycle (SDLC):



1. **Feasibility study:** Feasibility study provides a clear statement of the purpose of a proposed system. It discusses what the problem is possible, how something might be achieved and how much effort will be required to solve the problem.
2. **Requirement definition:** Requirement Definition produces a detail and accurate description of the problem and the needs of the stakeholders of that system. It also ensures that all the requirements are identified and no important requirements are forgotten or unrecorded.
3. **System specification:** System specification integrates the processes, interfaces and data definitions that support all the stakeholders' requirements. It also concentrates what a system must do and how the system might be achieved.
4. **System design:**
5. **Program design & coding:**
6. **Testing:**
7. **Implementation:**
8. **Change request definition:**

There are many methodologies to construct these steps but there is no fixed methodology for each step. It may vary in respect of the problem domain.

### **Different Methodologies:**

**Object Oriented Software Development Methodology (OOSDM):** OOSDM is widely used approach to problem solving takes an object oriented viewpoint. Here the problem domain is characterized as a set of objects that have specific attributes and behaviors and that are categorized into classes and subclasses.

A formal definition of object oriented, introduced by Coad and Yourdon [COA91], is:

Object-Oriented=Objects+ Classification+ Inheritance+  
Communication

The main features of OO Method are:

- **Information Hiding:** A well designed OO system always encourages information hiding. It hides the operational details of program component. Only the components that are allowed to access such information which are accessible only for those components.
- **Data Abstraction:** this is the mechanism that focus the essential focus the details of the program components(data or process)
- **Encapsulation:** dynamic binding: binding at runtime, polymorphism, virtual functions
- **Inheritance:** incremental changes (specialization), reusability

### The object-oriented software life cycle

- Analysis -- Conceptual Model, System Requirements
- Design -- System Design, Detailed Design
- Implementation -- Coding, Testing

### Function Oriented Software Development Methodology (FOSDM):

Function-oriented (or procedural) design decomposes the design into a set of interaction functions which act on a centralized state. This approach concentrates on the processing and algorithms of the system. Function-oriented design has been practiced since programming began, and there is a large body of design methods based on functional decomposition. However, while the functions hide the details of the algorithms, the shared state can be a particular problem as a function could change the state in ways not anticipated by other functions. It is commonly believed that object-oriented approaches (which also hide the state) are preferable. But function-oriented design is still important: In systems with minimal state (e.g. ATM), or which can be implemented by parameter passing, object-oriented approaches offer no significant advantages, and may even be less efficient. Many organizations have standards and methods based on functional decomposition. There are an enormous number of legacy systems out there, which have been developed using a functional approach, and need to be maintained (e.g. Windows, Linux).

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### **User-Centered Software Development Methodology (UCSDM):**

User-centered design has numerous benefits for business. *Firstly*, UCD methods result in higher-quality screen-based systems with increased customer satisfaction and confidence. In the competitive online market, a high-quality design can mean the difference between success and failure. It's a fact that customers abandon sites that are cumbersome and do not meet their needs. On the other hand, customers remain loyal to sites they can navigate. Forrester reports that 90% of customers would shop again at sites that met their expectations and 87% would tell friends and family about the site.

*Secondly*, under UCD methodologies, software development is more efficient. The system will likely go to market faster and cost less. The following table demonstrates that the average time required to fix a problem with software design or specifications is quite long and therefore very expensive. With a UCD approach, the product's design and specifications are frozen late in the development process. The method's constant customer feedback and design iterations weed out potential problems before they require hundreds of hours and thousands of dollars to fix.

### **Agent-Based Software Development Methodology (ABSDM):**

An *agent* is an encapsulated computer system that is situated in some environment and it is Capable of being flexible. In order to meet its design Objectives autonomous action has been taken (Jennings, 2000). There are two fundamental concepts associated with any dynamic or reactive system, such as an agent, that is situated in and reacting with some environment (Holcombe & Ipate, 1998):

An agent-based system is a complex software system with functional and nonfunctional constrain. Designing and building such system is a complex task. A goal-driven use case approach has been taken for agent-based system requirements analysis. The use case approach is used to elicit system requirements from user's point of view. Related use cases are assigned to corresponding roles. Each use case is then extended with goals for implicit requirements analysis from a role's point of view. Each role is treated as internal actor to find more system specific use cases. Five relationships between use cases and goals are then identified: satisfied, satisfiable, denied, deniable, and independent. Those relationships help find

the relationship among roles. Such relationships can be classified as cooperative, conflict, counterbalanced, and irrelevant. Identifying those relationships assists the system analyzer to analyze and optimized the relationships among roles. The contribution of this paper is a proposal to a systematic approach for implicit requirements analysis for agent-based systems.

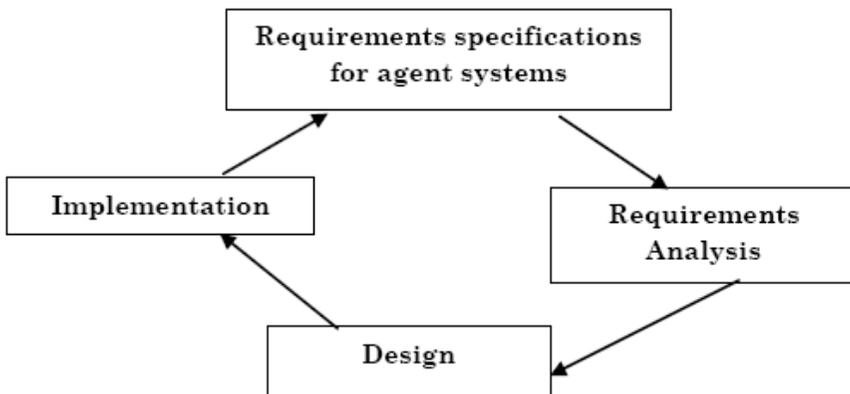
Agent-Oriented Software Engineering is an approach to developing software using agent-oriented abstractions:

- Agents
- High-level interactions
- Organizational relationships

**Why it is need:**

- Agent-oriented decomposition is an effective way of partitioning complex problems
- The key abstractions of agent-orientation is a natural way to model complex systems
- The agent-oriented approach to dealing with organizational relationships is appropriate for complex systems.

**Agent-Oriented Software Life Cycle**



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## Some General Application Areas:

### Industrial applications

- manufacturing
- process control
- Air Traffic Control
- telecommunications
- transportation systems

### Electronic Commerce

- electronic markets/auctions
- Buying agents (e.g. Jango, shopbot, etc)

### Business Process Management

### Information Management

- information gathering
- information filtering

### Medical Applications

- Patient Monitoring
- Healthcare

### E-Learning

- Intelligent Tutoring Systems

## Requirement Engineering:

In this part, it will be focusing about the requirement engineering and its importance. Finally, it will focus its practical application for Hospital Automation.

## Requirement Analysis:

**Definition:** the process which establishes the services the system should provide and the constraints under which it must operate is called Requirement Engineering (RE).

- Why Requirement Engineering is important?

- Importance: RE is first, major and time consuming part of SDLC. Analysis says 67% effort have to give for RE of whole SDLC to develop a **dependable** system and the rest 33% effort have to give for others steps – design, coding, testing and maintenance.
- If we capture the system, information by a well defined RE methods 67%work will complete. Error on the next step will be dramatically reduced. Consequently maintenances cost will be far less & system will be dependable.
- Another statistics say error for the requirement analysis (RA) is 56%,
- For design 27%, code 7%, other 10%.

So, well Requirement engineering (RE) is important to develop quality System.

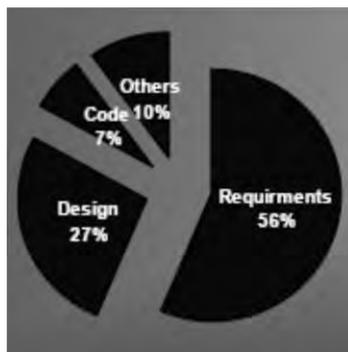
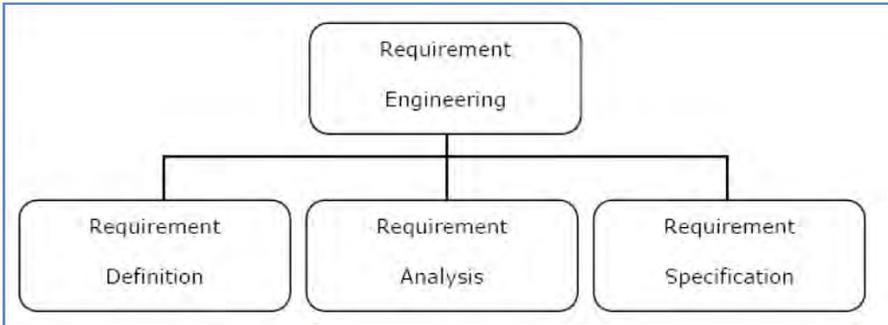


Figure 2: Errors in the development life cycle

### Requirement Engineering (RE):

Requirement Engineering is an activity that transforms the needs and wishes of customers and potential users of computerized systems usually incomplete and expressed in informal terms into complete, precise, and consistent specifications is preferably written in formal notations.



**Result (Application of the above four methods):**

Now I would like to implement all of these methods in our problem domain:

**Hospital Automation**

**Problem Domain Characteristics:**

In this part, it will be discussing the characteristics of our problem domain to analyze and specify system requirements successfully. If the system requirements are not captured accurately, the proposed system will not run successfully.

The domain characteristics include- environmental characteristic, behavioral characteristics, and *system characteristics* [C. G. Devies].

Here, in this part it will be focusing the domain characteristics as follows:

**Environmental characteristics:**

In the environmental characteristics, it is concerned with recording general information, which characterize that domain- the interested users or stakeholders in the domain, the fundamental nature of the problem, and the general environmental factors and constraints.

The Figure 1 shows the main components of our problem domain. Now it will be examining in turn.

**Stakeholder list:**

Stakeholders and system components are the interested parties of the proposed system. In the Hospital Automation system example, the possible stakeholders would include- the receptionist, account officer, medical officer, matron, OT in-charge, pharmacist, pathologist, storekeeper.

The Table-3.1 shows the stake-holder list of Hospital Automation (HA) problem with their status (primary, secondary and tertiary), functions, objectives, association with others users and their problems. The status will give information about the type of the stakeholder.

For example, in the **column (2)**, the receptionist is the primary user that is s/he interacts with the system directly.

The objectives and functions of users assist the system developer to identify the system events and their information requirements very easily. For example, the functions [**column-(3)**] of the receptionist are patient’s registration and admission, patient query and discharging of indoor patients. And the objectives [**column-(4)**] of the receptionist are preserving previous records, maintaining released patients information, and collecting payments from patients. The association with the stakeholders and potential users [**column-(5)**] are recorded for identifying the relationship with the users that helps the analyst to create **Entity-Relationship** diagram. For example, the receptionist is dependent with account officer for billing purpose, pathologist for report collecting, matron for checking bed availability, and medical officer for patient discharging. And the problems [**column-(6)**] are identified for modeling the domain and providing system functions. For example, the receptionist faces the problems like missing previous record, maintaining admission serial number, getting wrong information of patients.

**Table 3.1:** A sample-recording schedule for information about Hospital Automation (HA) stake-holders / Users:

Stakeholder (1)	Status (2)	Function (i.e. jobs tasks) (3)	Objective (i.e. why?) (4)	Associate With other Users (5)	Problem (6)
Receptionist	Primary	<ul style="list-style-type: none"> <li>- Registration</li> <li>- Admission</li> <li>-Report collection &amp; delivery</li> <li>- Patient query</li> <li>- Discharge of in-patient</li> </ul>	<ul style="list-style-type: none"> <li>- To preserve previous Record</li> <li>- To get better word / bed</li> <li>- Get Patient information</li> <li>- Released patient info.</li> <li>- Collect payment</li> </ul>	<ul style="list-style-type: none"> <li>- Account officer</li> <li>- Pathologist</li> <li>- Matron</li> <li>- Medical officer</li> </ul>	<ul style="list-style-type: none"> <li>- Missing previous record.</li> <li>- Admission Serial maintain</li> <li>- Patient fail to payment bill</li> <li>- Get wrong information from illiterate patient.</li> </ul>

**Environmental Factors and Constraints:**

The Table-3.2 illustrates the environmental factors and constraints’ references, their description and impacts on organization to describe the constraints and non-functional requirements of the domain. It also describes the impacts on organization. This kind of information is so important because it will affect a variety of design decision to be made in the development process. For example, one of the reference environmental constraints is drug law. This is described in **column-(2)** and how it affects the hospital in **column-(3)**.

**Table 3.2:** Environmental Factors and Constraints occurred in Hospital Automation (HA)

Reference (1)	Description (2)	Impacts ... (3)
Drug law/ BSTI	BSTI marks some medicines that are prohibited for marketing and consumption.	This medicine cannot store and medicate in the hospital. Hospital authority will be responsible for bad impact of these medicines.

**Problem / Requirement List:**

The **Table-3.3** shows the problem name, problem symptoms, impact on organization, cause of the problems and problem priority. The problems are those that are identified in the stakeholder list. The symptoms (who or what are effected) [**column-(2)**] are discovered to identify the root of the problem to be solved. For example, the symptom of the problem- missing previous record is occurred when patient needs previous record when he/she comes more than once. The form also describes the impact [**column-(3)**] on organization that helps us to determine what problems are more or less harmful for the organization. For example, if the receptionist faces the problem- missing previous record occurred then the data may redundant. Next, it will try to find out the cause of the problem to resolve and finally, prioritize the problem so that problems with highest priority have to be solved immediately. For example, for those problems the register book may be very large that is difficult to maintain.

Therefore, the overall objective of this table is to provide a scope for the modeling of the real world problem and identify the user information generating functions.

**Table 3.3:** Problems / requirements list of the users

Name (1)	Symptoms (who or what are effected) (2)	Impact on organization (3)	Cause of Problems (4)	Priority (5)
<ul style="list-style-type: none"> <li>- Missing previous record.</li> <li>- Admission Serial maintain</li> <li>- Patient fail to payment bill</li> </ul>	<ul style="list-style-type: none"> <li>-When patient need to come more than once, they need previous record.</li> <li>-VIP or some people try to take early appointment.</li> <li>-Request for concession</li> </ul>	<ul style="list-style-type: none"> <li>-Redundant information so high maintenance cost</li> <li>-Maintenance problem</li> <li>-Loose profit</li> </ul>	Register book is large or may have many volume that is difficult and time consuming matter	1

**Behavioral Characteristics:**

After describing the environmental characteristics, it will be discussing about the behavioral characteristics of the system. It includes *object inventory*, *process inventory* and *event list*.

**Object Inventory:**

The **Table 3.4** shows object inventory of the problem area which includes name, description, dependencies or associations with other objects, access, availability and location, possible states, and processed by of objects.

For each object, a brief description is given with their dependencies or associations with other objects that helps the analyst to construct graphical representation of the associations between objects such as: **Entity-Relationship model** etc. Access, availability and location describe the accessibility and availability of the objects. Finally, the possible states and process information help the analyst to identify and describe the states and processes of the system that will eventually cross-reference with the event list and process inventory respectively.

For example, the object patient has a relationship with doctor, nurse, and its possible states are enquiry, change, and discharge. And states are processed by patient registration, admission and discharging.

**Table 3.4:** Identified Objects Inventory of Hospital Automation (HA)

<b>Object name (1)</b>	Patient
<b>Description (2)</b>	Who is admitted or registered in the hospital for long or short term treatment.
<b>Dependencies/Associations with other Objects (3)</b>	Doctor Nurse Receptionist Account officer
<b>Access, availability and Location (4)</b>	Patient information is maintained in a master book record. Each patient has a reg. no as shown in the appropriate patient record book
<b>Possible States (5)</b>	Enquiry Change Discharge
<b>Processed by (6)</b>	PatientRegistration Patient Admission PatientDischarging

**Process:**

The **Table 3.5** shows the processes that change the states of the objects of Hospital Automation (HA) and their description, users, related objects and start/stop events.

Firstly, this form contains the process name that comes from Object Inventory table and this process is the part of the function of a department. Next it shows the process and associated users and objects that determine who starts the process and where. Finally, it starts and stop events are also recorded for process triggering. Therefore, the aim of these information is to begin understand the dynamic and behavioral aspects of the domain.

**Table 3.5:** Processes of that can change the states of objects for Hospital Automation (HA)

Process name (1)	Part of function... (2)	Description (3)	Users (4)	Objects (5)	Start/Stop Event (6)
Patient registration	Receptionist Desk	Fill-up the patient's information form.	Receptionist	Patient registration form	<b>Start:</b> entry patient's information. <b>End:</b>

**Event List:**

The **Table 3.6** shows the events name and their description, caused by an association of the process. After listing the name of the event, this form describes the event and cause of the event i.e. when and why the event is triggered. The final aspect of the problem domain's activity description to be recorded is the events, which occur in the domain. The rule for identifying events is that they must be at an instantaneous point in time and result in the changes of an object.

**Table 3.6:** Event list that trigger the processes of Hospital Automation

Event name	Description	Event caused by	Associated functions/Processes
Patient register	The point of time at which a person can be a registered patient of that hospital.	Patient information entry for treatment	Patient registration

**System Characteristics:**

After describing behavioral characteristics, it will discuss about the system characteristics. It is important to note that it is only the characteristics of the solution, which are being considered. At this stage, it is tried try to identify the general characteristics of a solution.

System characteristics contain *information generation requirements, system function outline* and *system transaction*.

**Information generation requirements:**

The aim in considering the information generation requirements of a system is to attempt to define the overall purpose and goal of proposed system.

The **Table 3.7** shows the name of the output report, together with a description, the process that is associated and the user for whom the information is intended and the contents of the report. For example, the report named patient registration details is generated by patient’s registration process and this process is triggered by receptionist. This **Table 3.7** shows the contents of that report.

**Table 3.7:** Information Generation Requirements recording schedule

Report Name	Generated by process	For user.	Contents
Patient Registration Details	Patients registration	Receptionist	This report contains all information about patients such as ID, Name, age, sex, Father/Husband name, Address, References.

**System Function outline:**

The **Table 3.8** illustrates the sample system function outline. For each proposed system function outline the main objective of the function are listed, together with an outline of processing the developer can start to identify the particular transaction to be supported by system. For example, this table shows the registering function with its objective- preserving all information of patient, and outline processing- preservation of information requires facilities for medical history and maintaining patient service. The problem of the function described in the **column-(4)** is awareness of previous & present record. This table also explains the problem of the function and the users who execute the function. For example, the registering process is triggered by front desk officer- receptionist.

**Table 3.8:** system function outline recording schedule

Function Reference	Objectives	Outline/ Processing	Problem addressed	Users
(1)	(2)	(3)	(4)	(5)
Registering	Preserving all information of patient to provide service.	-Preservation of information requires facilities for medical history  -maintaining patients service	Awareness of previous & present record	Front office desk (Receptionist)

**System transaction:**

The **Table 3.9** shows the sample of system transaction for Hospital, which describes the users, transaction name, precondition and description. These transactions summarize the function to be included in the network phase of the system development and cover both input and validation.

For example the transaction registration is initiated by receptionist and its precondition is recommendation of medical officer and the description of the transaction.

**Table 3.9:** system transaction for Hospital Automation (HA)

User	Transaction name	Precondition	Description
Receptionist	Registration	-Recommendation of Medical Officer  -Availability of respective doctor  -Availability of ward/bed  -check sponsor status	The system response with these preconditions for patient registration. If the criteria are not match, the proposed registration cannot be performed.

**OMT Method:**

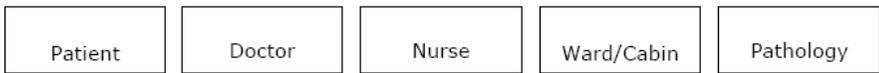
OMT (Object Modeling Technique) is an Object Oriented that consists of three kinds of models- *i. Object Model*, *ii. Dynamic Model* and *iii. Functional Model*. It is applied all of these models in our problem domain below.

**Object modeling:**

In the first step, object model analyzes the requirements to describe real world object classes and their relationships to each other. To construct an object model the following steps are performed:

- **Identify objects and classes:**

The first step to construct an object model is identifying relevant object, classes from the problem statement. All classes must make sense in the problem domain. In our problem domain, some of the classes are identified from the problem statement in the following:



**Figure 5.1:** A few objects and classes of Hospital

The above figure named Figure 5.1 shows some classes and objects- patient, doctor, nurse, ward/cabin, pathology. Patient who is registered or admitted to hospital for treatment, Doctor who serves the patients, Nurse who is helping hand of doctor, ward/cabin where patients live during treatment and Pathology in which patients test their body’s specimen to determine the diseases they are suffering.

- **Prepare data dictionary:**

Data dictionary is the precise description of all modeling entities. It describes the associations, attributes and operations. Here is a data dictionary of above objects.

<p><b>Patient:</b> Who takes the services from the hospital?</p> <p><b>Doctor:</b> the employee or visitors who investigate the patient’s diseases and give the proper treatments for the patient.</p> <p><b>Nurse:</b> the employee who is helping hand to the doctors and nursing to the patients.</p> <p><b>Ward/Cabin:</b> that consists of several beds where the patients stay and take the services from hospital. Ward/cabin can be deluxe, super deluxe, economy.</p> <p><b>Pathology:</b> the department where all diagnosis tests are performed and create report.</p>
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**Figure 5.2:** Data dictionary of some classes of Hospital Automation

- **Identifying the right association:**

Next, is to identify the right associations between classes. Any dependency between two or more classes is an association. For example, in the [Fig- 5.2] the association within patients and doctor is patient need ward/cabin to staying in the hospital

- Patient needs ward/cabin to staying in the hospital
- Patient gets test report from the pathology department
- Doctors gives treatment to the patients
- Nurse helps the doctors.
- Pathology tests the all kinds of diagnosis tests.
- Patients get the bill when s/he discharged.

**Figure 5.3:** A few of right associations of Hospital Automation (HA)

- **Identifying Attributes:**

Next, the Table 5.1 shows the identifying objects with attributes. For example, patient is a object with attributes Patient ID, name, address, age, sex, father’s/husband name, blood group etc.

**Table 5.1:** The attributes of the objects identified from the Hospital Automation (HA)

Objects	Attributes
Patient	ID, name, address, age, sex, father’s/husband name, blood group
Ward/cabin	Ward ID, Ward Name, bed ID, types of ward/cabin, rent of bed.
Doctor	Doctor ID, name, designation, visiting time, contact #, address
Nurse	Nurse ID, name, category, working session, contact #, address

The Figure 5.4 shows the Object model of Hospital with some of the objects and their attributes. In this figure patient is depend on doctor for getting treatment and doctor is depend on nurse for taking help and patient is depend on nurse to get better nursing.

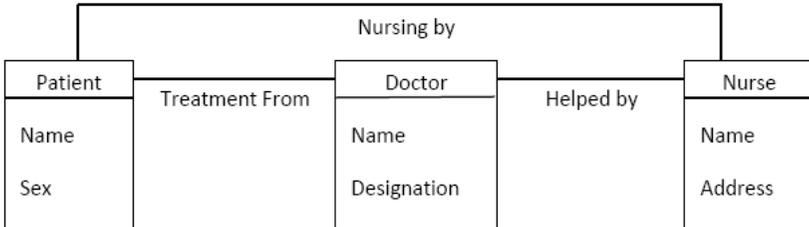


Figure 5.4: Hospital object model with attributes

- **Refining with Inheritance:**

The next step is to organize classes by using inheritance to share common structure. Inheritance can be added in two directions by generalizing common aspects of existing classes into a super class (bottom up) or by refining existing classes into specialized sub classes (top down). It can be discovered inheritance from the bottom up by searching for classes with similar attributes, associations, or operations for each generalization; define a super class to share common features. **For example**, in the [Figure 5.5] ward booking, OT booking and ambulance booking are similar except in their initiation and can be generalized by booking.

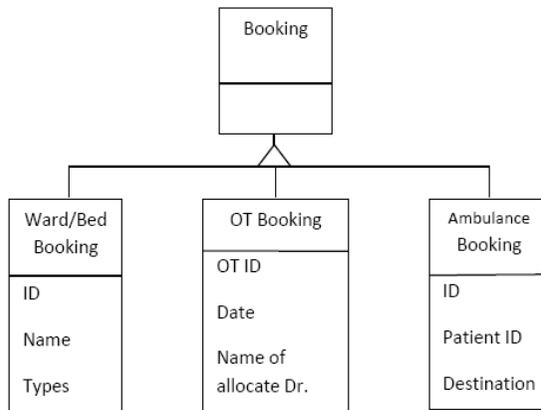


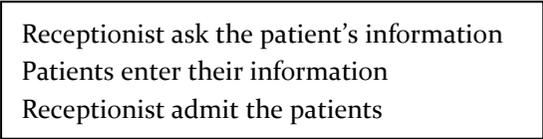
Figure 5.5: Hospital object model with attributes and inheritance

**Dynamic:**

The dynamic model shows the time dependent behavior of the system and the objects in it. From the Beginning, dynamic analysis is looking for events. Then summarize permissible events sequences for each object with a state diagram.

- **Preparing a scenario:**

Preparing one or more typical dialogues between user and system is to get a feel for expected system behavior. This scenarios show the major interaction, external display format and information exchange. A scenario is a sequence of events. An event occurs when an information exchange between an object and outside agent. For example, the [Figure 5.6] shows a scenario of major interaction within the objects patients and receptionist. Here receptionist asks the patient’s information to register or admit.



**Figure 5.6:** normal Hospital Automation (HA) scenario

- **Identifying events:**

Examine the scenarios to identify all external events. Events include all signals, inputs, decisions, interrupts, and actions to or from users or external devices. For example, the [Figure 5.7] illustrates one event- Receptionist registers patient that gives the knowledge of actions, decisions and objects of the event.

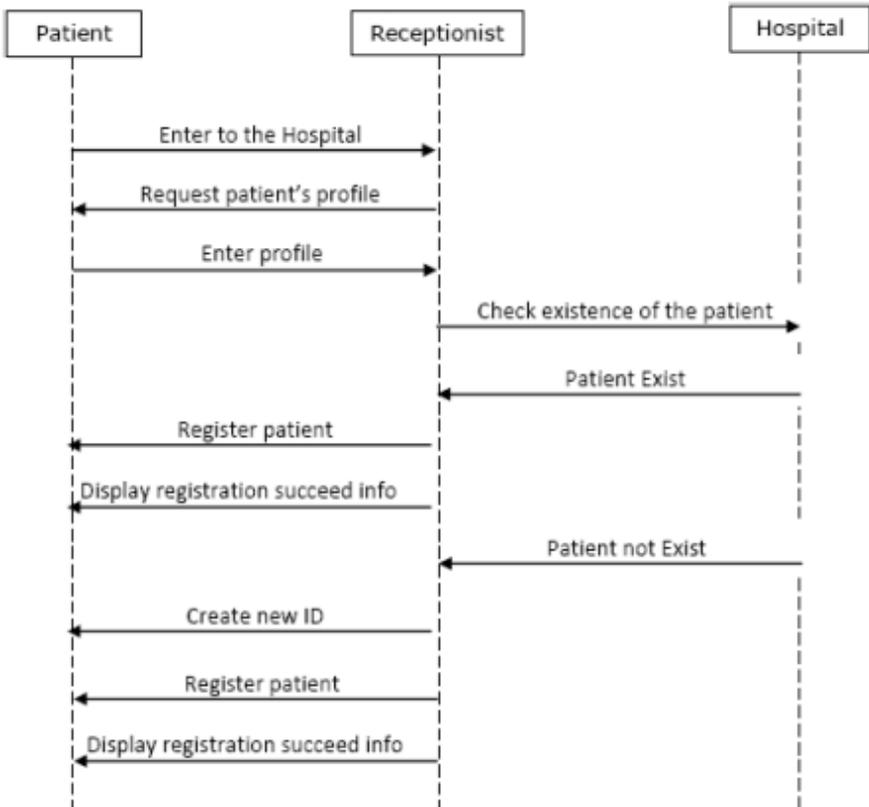


**Figure 5.7:** One event of reception desk of Hospital

**Event trace diagram:**

Event trace is an ordered list of events between different objects assign to column in a table. The [Figure 5.8] shows an event trace for a patient registration scenario. If more than one object of the same class participates in the scenario assign a separate column of each object by scanning a particular in the trace, it can be seen the events that directly affect a particular object. Only these events can appear in the state diagram for the object.

For example, when the patient enters to hospital, receptionist requests that patient’s profile and enters that profile. If name and date of birth are matched then return previous ID otherwise create new ID and stores the records and registers the patient successfully.



**Figure 5.8:** Event trace diagram of reception desk of HA

### Event flow diagram of reception of Hospital:

The Figure 5.9 shows the events between groups of classes on an event flow diagram. This diagram summarizes events between classes, without regard for sequence. Include events for all scenarios. The event flow diagram is a dynamic counterpart to an object diagram. A path in the object diagram shows possible information flow; a path in the event flow diagram shows possible control flow.

For example, receptionist requests patient for profile and enter the profile to system. System checks name and date of birth. If they are matched with previous record then return previous ID otherwise create new ID. Finally, after registration it displays successful registration information.

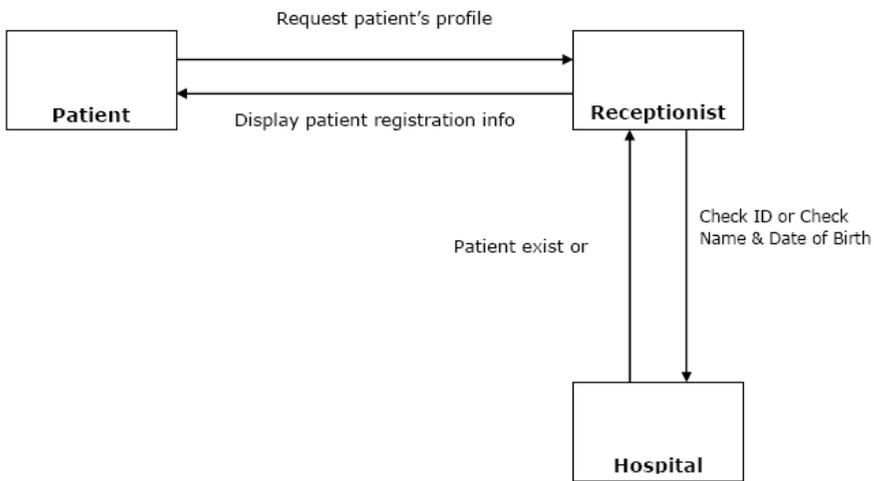


Figure 5.9: Event Flow Diagram of an event

- **State diagram of receptionist of HA:**

Preparing a state diagram for each object class with nontrivial dynamic behavior, showing the events the object receives and sends. Every scenario or event trace corresponds to a path through the state diagram. For example, the [Figure 5.10] illustrates the state diagram of registration process. Here when registration request is made then enter registration information and verify name and date of birth. If patient exists then return previous ID otherwise create new ID and then complete the registration.

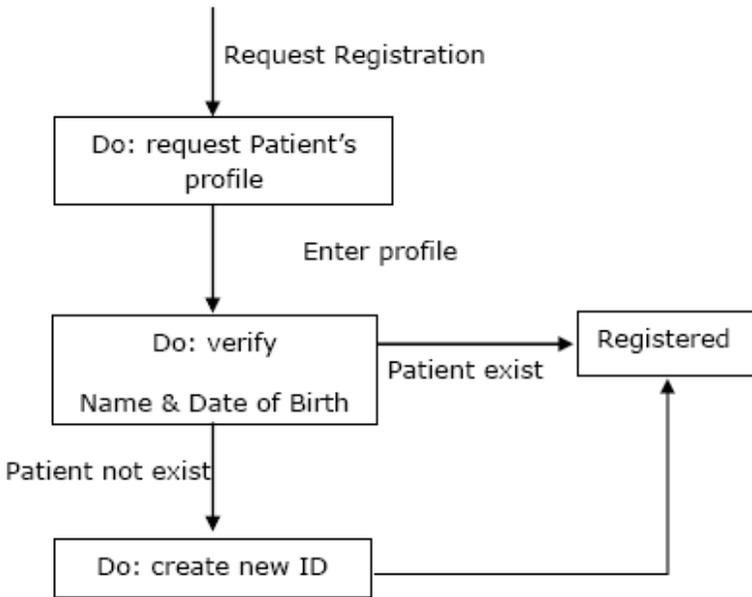


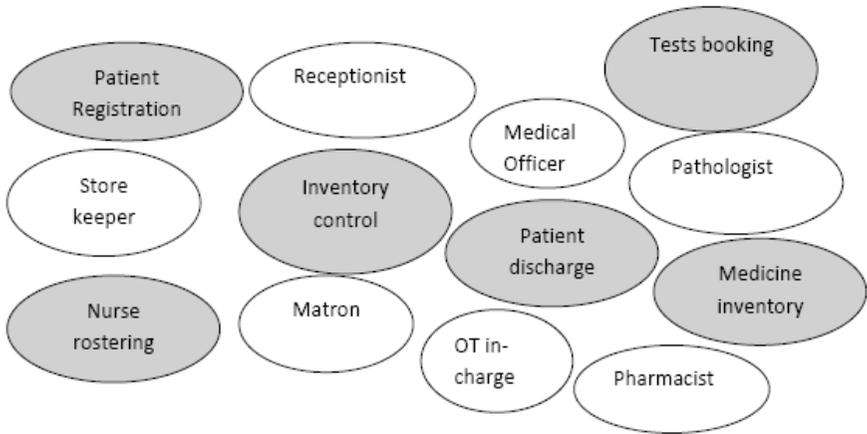
Figure 5.10: State Diagram of Receptionist of Hospital

**VORD method:**

The VORD method [Somerville, 1992] principally detects and analyzes the requirements and translates into Object Oriented system models by viewpoint identification, viewpoint structuring, viewpoint documentation and system mapping. This paper is tried to analyze the problem domain, a portion of the Hospital, and translates them into system models by following the VORD Method mentioned below.

**Viewpoint Identification:**

The stage in the viewpoint analysis of the VORD method is the identification of possible viewpoints/users and their services. This stage is probably difficult in all other methods. The brainstorming is an approach to identify the viewpoints and services that interact with the system. The following [Figure 5.1] illustrates the viewpoints and their services where the **white** ovals are viewpoints and the **shadow** ovals are services.



**Figure 5.11:** Brainstorming for Viewpoint Identification for Hospital

Viewpoint structuring involves grouping related viewpoints into a hierarchy. Common services are provided at higher levels in the hierarchy and are inherited by lower level viewpoints.

The [Figure 5.12] is the demonstration of the structure of the viewpoints that describes the services according to the viewpoints. Here the services may pick up successfully that helps the developers or analyst to identify the events, functions and processes with objects. For example, the Fig- shows matron is higher-level viewpoint of its lower level viewpoints Nurse in-charge and OT in-charge. Services of matron are recording doctor’s visiting time, keep medicine consumption record, patient transferred to desired ward check ward or bed availability. These are the common services of the nurse in-charge and OT in-charge. But their individual services are nurse roster, ensuring better nursing and maintain OT as per schedule, sterilization of all OT equipments respectively.

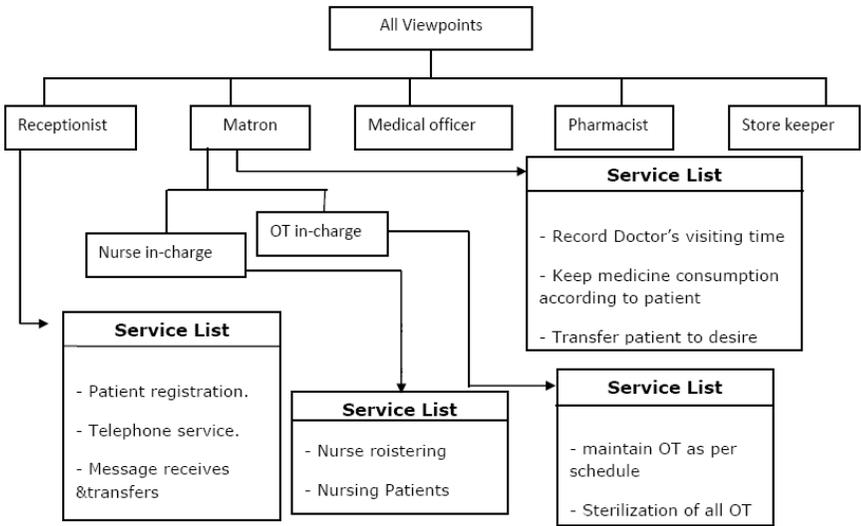


Figure 5.12: Viewpoint Structuring of Hospital Automation

**Viewpoint documentation:**

Viewpoint documentation concerns with refining the description of identified viewpoint and services. It includes viewpoint template and service template. It also includes the event scenarios.

Viewpoint template describes the reference, attribute, events, service, and sub-viewpoints of the viewpoint. For example, in the [Figure 5.13] the viewpoint reference, receptionist has attributes-EmpID, name, Sex, and working period. S/he performs the **start**, **end** and **cancel**s events of patient registration and discharge. The services are outpatient registration, in-patient admission and patient discharge and the sub-viewpoints of receptionist.

The service template of viewpoint explains the details of the services that include reference, rational, specification, viewpoint, non-functional requirements, and provider.

For example, the [Figure 5.13] shows the rational of the patient registration service is- to identify & preserve the previous patients & medical history or records. The specification of patient registration is- receptionist collects patients profile and then inputs to the system and receives confirmation.

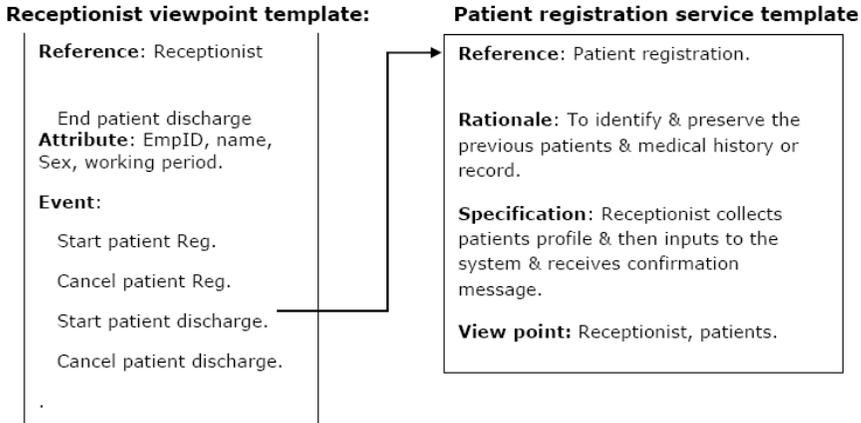


Figure 5.13: viewpoint template and viewpoint service template

The [Figure 5.14] demonstrates a scenario of an event, patient registration that realizes the total operation with inputs, processes and output. Here input is patient’s profile. The system processes the profile and takes only name and date of birth to check the existence of patient’s profile. If exist then returns previous ID otherwise create new ID and registers the patient.

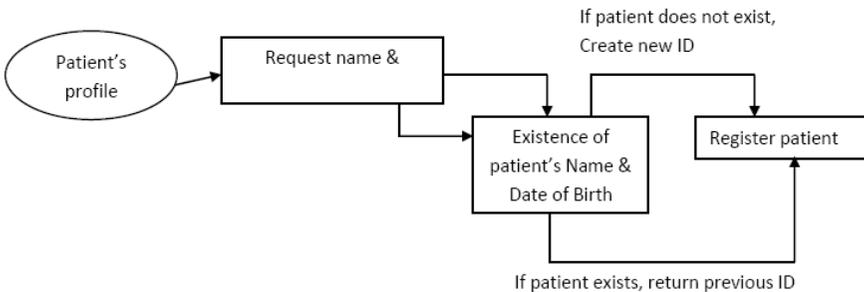


Figure 5.14: Scenario of patient registration event

**Viewpoint system mapping:**

The viewpoint system mapping specifies the requirements of system and shows the flow of data with process, entity, and file. In the [Figure 5.15] explains the flow of data among entities-patient, receptionist and medical

officer, process-registering patient and file-patient profile. It is a part of the system mapping.

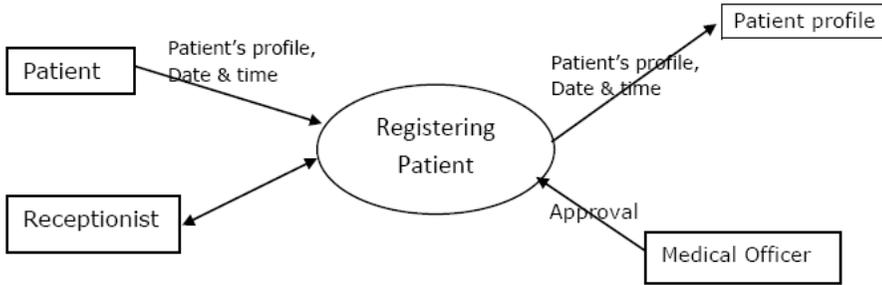


Figure 5.15: Data Flow Diagram of registering patient process

## Discussion

On the basis of above results it can be observe that the four methods are functioned differently as their own way. But all of them do not support all stages of RE framework strongly.

In OMT method, it can be easily identified the possible objects. Identifying the right associations, attributes of the objects, creating object model with attributes and inheritance we can refine the objects. But making objects inheritance is bit difficult. So refinement of objects is ambiguous. But dynamic modeling is easier by preparing scenario, identify events, creating event trace diagram, event flow diagram and creating state diagram.

**Jackson approach**, analysis of the Requirements in various angles. First it identifies all the users and their functions, associations, problems. It measures the user status primary, secondary, tertiary. But other methods do not support this. After identifying all the problems, it analyzes their symptoms, impact on organization and their causes. It identifies the problem priority, but others methods do not prioritize the problems. After that it tries to identify the objects. But there are no obvious techniques to refine and extract exact objects. After identify the objects, it specify the associated process and events regarding the object all above are the part of Requirement Analysis (RA).

It performs, the Requirement Specification (RS) by the tables -- **Information Generation Requirements**, which identify the objects, attributes and related process, **System Function Outline** which broadly categorize the system function that user can perform with the system and hence provide a means for scoping the overall activities of the system.

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It validate input, process by System Transaction and update the real world model, this transaction may be part of validation of input of system specification that corresponds the network stage of Jackson approach.

**VORD method** principally intended for requirement discovery and analysis. It also includes steps to help translate this analysis into an Object Oriented System Model. Information collected from different viewpoints is systematically transformed to object oriented design. The first stage of VORD Method concerns with viewpoints and services identification, viewpoint structuring and documentation.

Here viewpoints and services are identified by mainly brainstorming. Unallocated services can suggest viewpoints that have not been identified in the initial brainstorming session. It does not consider problem arises during the services provided the stakeholder. After viewpoints identification it performs viewpoints structuring with viewpoint hierarchy. It also prioritizes the requirements. But it doesn't set the priority problems (service problem) unlike Jackson approach.

OMT method also doesn't prioritize the service problem. It does not explicitly categorize the viewpoints. It shows the association of viewpoints by viewpoint structuring with their common and specific service. Jackson approach shows the association of stakeholder but how they interact / associate, it does not explicitly mention.

Third stage, viewpoint documentation is performed by viewpoint templates and service templates, which identify attributes, events, services of viewpoints and identify the causes, specification, non-functional requirements for each service.

During the first stage/Analysis phase, VORD method does not explicitly identified the objects. But in the fourth stage of system mapping they transfer viewpoint documentation into object model for Requirement Specification.

VORD method does not consider the validation of Requirement Specification (RS). In Requirement Analysis (RA) they don't discuss about process. Only in DFD, System Specification, It discusses about the processes before system mapping, system analyst ignores about the process.

## Conclusions

From above review, it may observe that Jackson approach better follow the Requirement Engineering (RE) framework but object identification and their refinements are not perform in this method. Though object identification and their refinement for extracting the exact object is inevitable in Object Oriented method. It can be seen that OMT method provide better way for this approach, so our proposal is to incorporate Jackson and OMT for aggregating their better feature and excluding insufficient feature. As OMT provide better way of object identification and their refinement but Jackson provides all other Requirement Engineering (RE) framework stages. So it's may include this OMT feature to Jackson approach which may be better method for Requirement Engineering.

If we think only based on Requirement Engineering (RE) then Jackson approach may be better. If we think fully OORE, then OMT will be better. Though, we see that VORD method analyze the problem without regarding function or Object Oriented method. The out of analysis of VORD method can be translated in to Object Oriented Requirement specification named as system specification. In Jackson Approach class and inheritance is not defined but it discusses about association of how objects are associated.

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## The Impact Of Institutional Quality On Economic Growth And Development: An Empirical Study

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*During the last twenty years economics literature and debates have increasingly referred to institutions as the answers to the longstanding questions concerning how economic growth arises, what policies can be used to promote best results in terms of economic performances and what accounts for differences in GDP levels among countries so that the analysis of the institutional framework under which any economy operates has now become an indispensable object of research. This paper will investigate the impact of institutional quality on economic growth over sixty years among countries at different stages of development recurring to three institutional indicators tested through a pooled regression model and a fixed effects model.*

**Keywords:** *Institutions, Growth, Development, Investment, Quality of Government*

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### Introduction

During the last twenty years, economic literature has progressively come to a unanimous agreement on assigning a fundamental role to the implementation of an efficient institutional and legal framework for encouraging growth and facilitating economic transitions and social reforms. However, this recognized necessity of institutional reforms in order to guarantee solidity to economic reforms and to the consequent, awaited, development is quite recent and finds its origins in the fecund debate arisen

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after the emerging of weaknesses and criticalities embedded in the strategies and the actions of international organisms and financial systems, criticalities even more evident pursuant to the recent financial crisis.

As a result the World Bank has been forced to reconsider the efficacy of its own operate in developing countries and transition economies; this critical revision pattern is well represented by the works of J. Nellis<sup>1</sup>, who, even defending positive achievements of some programs, does not deny the existence of failures and the consequent need of rethinking the theoretical model: in this sense according to the author the most serious deficiency in the World Bank strategies was to find in the scarce attention paid by international organisms to support economic reforms through political and institutional mechanisms as for example the missed creation of a strong administrative system or legal apparatus able to sustain the economic transition. This new orientation pinpointing the causal nexus between institutional framework and economic growth is highlighted with the World Development Report 2002 “Building Institutions for Markets” focusing the attention on which institutions are essential to increase market development. As the “institutional issue” took a curtain call at new millennium’s eve playing a leading role to pursue economic growth and development, a methodological problem concerning what the term “institutional” effectively meant soon showed up. Havrylyshyn and McGettigan<sup>2</sup> clearly express this sense of loss and confusion concerning the definition of “institutional framework”. During the last decade economic literature has constantly dedicated attentions to the correlation between institutions and growth generating heterogeneous branches of research<sup>3</sup> but

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<sup>1</sup> Nellis, J, (1999) “Time to Rethink Privatization in Transition Economies?, IFC, Discussion Paper.

<sup>2</sup> O. Havrylyshyn e D. McGettigan, 1999, “Privatization in Transition Countries: A Sampling of the Literature”, IMF Working Paper No. 6/990p.

<sup>3</sup> Among all, the most relevant may be summarized in five groups according to the elements taken into account:

a) deterministic approach: numerous studies have noticed significant correlations between geological, ecological, geographical and historical characteristics and economic performances showing a sort of pessimistic view embedded with determinism as the characteristics analyzed cannot be changed, for close examination see: Diamond, 1997, “Guns germs and steel: fates of

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b) liberal and authoritarian institutions: some studies concentrated on the level of freedom institutions should offer to favor growth. Barro, for example, suggests that democracy increases growth when political liberties are weak but decreases it when some liberties already exist. Rodrik emphasizes the role of democracy in determining quality growth. La Porta et al. instead affirm that developing countries succeed in obtaining good economic performances under dictatorship and choose democracy only after. For more on the debate see: La Porta et al., 2004, “Do institutions cause growth?”, Barro, 1999, “The terminance of economic growth: a cross-country empirical study”, p.61, Persson, 2005, “ Forms of democracy, policy and economic development”, Keefer, 2004, “What does political economy tell us about economic development-and vice versa?”, Rodrik, 2001, “Development strategies for the 21st Century”, Besley et al., 2005, “Political competition and economic performance: theory and evidence from the United States”, Bardhan, 2005, “Scarcity, conflict and cooperation: essays in political and institutional economics of development”, Islam, 2003, “Do more transparent governments govern better?”, Rodrik and Waziarg, 2004, “Do democratic transitions produce bad economic outcomes?”, Acemoglu, 2003, “Why not a political Coase theorem? Social conflict, commitment and politics”.

c) formal and informal institutions: one of the usual frameworks to investigate the distinction between formal and informal institutions is given by contract management through rules or relationships. In informal institutions, transactions occur between two parts belonging to a same group based on linguistic, ethnic and cultural bonds and contracts are personal and implicit. When a contract is broken, other members may punish the one who broke it towards social sanctions. In formal institutions based on rules, contracts are protected by authorities with high cost in terms of legislation, regulation and application. The dialectic of this branch examines whether informal institutions are preferable to formal ones or vice versa. At this

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regard see: De Soto, 2004, "Law and property outside the west: a few new ideas about fighting poverty", Rubin, 1994, "Growing a legal system in the post-communist economies", Berglof and Caessens, 2004, "Corporate governance and enforcement", Hay and Schleifer, 1998, "Private enforcement of public laws: a theory of legal reform", Li, 2003, "The benefits and costs of relation-based governance: an explanation of the East Asian miracle and crisis", Dixit, 2004, "Lawlessness and economics", Greif, 2004, "Impersonal exchange without impartial law: the community responsibilities system", Widner, 2000, "Are specialized courts the right approach to effective adjudication of commercial disputes in developing countries?", Ensminger, 1997, "Changing social norms: common property, bride wealth and clan exogamy".

d) institutional change: this orientation of studies focuses the attention on how institutional reforms affect economic performance. The problematic knot concerns the way the change must be conducted, whether fast and global or sequential and gradual. To draw an exhaustive panoramic consult: Aslund, 1995, "The keys of radical reforms", Murrell, 1992, "Evolutionary and radical approaches to reform", Heybey and Murrell, 1999, "The relationship between economic growth and the speed of liberalization", Pritchett, 2003, "A toy collection, a socialist star and a democratic dud?", Olson, 1982, "The rise and decline of nations", Williamson, 2000, "The New Institutional Economics: taking stock, looking ahead", Hsieh, 2000, "Bargaining over reform". World Bank in its World Development report all in all seems to support rapidity but not without prudence and caution.

e) institutions and governance: at the center of these studies there is a kind of assimilation between governance capacity and institutions as economic growth engine. Countries with unstable governance make economic agents act under uncertain conditions determining weak property right enforcement and protection and therefore they fail tempting to activate a constant growth process. For further information see: Olson et al., 1998, "Governance and growth: a simple hypothesis explaining cross-countries differences in productivity growth", Perotti, 1996, "Growth, income distribution and democracy: what the data say", Kaufman and Kraay, 2007, "Governance Indicators: Where are we, where should we be going?".

f) institutions and social conflict: another interesting institutional approach proposed by Rodrik proceeds from the results performed by different economies after the Second World War. The countries that registered better economic results had previously succeeded in elaborating more efficient institutions at internal social conflict management, each of them according to its own model of development, implementing social and security policies, income distribution, law enforcement, democratic delegation, linguistic and ethnic melting. At this regard see: Rodrik, 1999, "Making openness work", 2007, "One economics, many recipes:

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there is still no possibility to find general consensus about “which” and “how many” institutions do influence economic growth<sup>4</sup>. An even brief literature review can give an idea of how many cues institutional theories can offer to improve the comprehension and the analysis of economic dynamics at different levels of depth. In fact, these cues led growth theory and development economy to adopt new perspectives towards a paradigm change based on indispensability of institutions. A shift welcomed with enthusiasm by empirical research due to the countless inquiry possibilities to be profiled.

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globalization, institutions and economic growth”, 2010, “Development policy and development economics: an introduction”.

g) institutions as social infrastructure: Jones and Hall highlighted the relationship between human capital, productivity and social infrastructure defined as the set of policies and institutions set by the government that determines the economic environment in which agents accumulate specialization, know-hows and capital and produce output. The process of accumulation depending on social infrastructure flows into production directly affecting economic growth. For this reason countries with weak institutions fail to perform as countries with stronger institutions. See: Jones and Hall, 1999, “Why do some countries produce so much more output per worker than others?”, Acemoglu, 1995, “Reward structures and the Allocation of Talent”.

<sup>4</sup> In order to understand the heterogeneity of the opinions about the institutional issue see also Chong and Calderon, 2000, who state that not only institutions encourage development but also development itself pushes the quality of institutions creating a vicious circle from low economic growth to low institutional quality and so even lower economic growth; also J.Hewko, 2002, reversing what La Porta et al. and Pistor et al. said before, affirms that direct foreign investments increase institutional and legal quality levels in a country introducing new habits and know-hows and asking state and local administrations for stronger efficiency. La Porta R, F. Lopez de Silanes, A. Shleifer and R Vishny, 1997, “Legal Determinants of External Finance”, *Journal Finance*, vol.52, number 3 pag. 1131-1150; Pistor. K, M. Raiser and S. Gelfer, 2000, *Law and Finance in Transition Economies*, CID at Harvard University, Working paper number 49; Chong A. and C. Calderon, 2000, *Causality and Feedback Between Institutional Measures and Economic Growth*”, *Economics and Politics*, vol. 12 number 1 pag. 69-81; Hewko J.,2002, *Foreign Direct Investment - Does the Rule of Law Matter?*, Working Paper number 26, Rule of Law Series, Canregie Endowment for International Peace.

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However, experimental results, rather than offer a key to the reading of the relationship institutions/economic performance directly utilizable for the elaboration of an essential and general economic theory, ended up in creating a pure speculative contest, full of ambiguities, without a prevailing vision. The focalization failure on one hand resulted from the difficulty to define institutions themselves on the other hand has certainly been determined also by the hard choice concerning the unit of measure of institutions, that is institutional quality, from time to time referred to an unsustainable variety of factors ranging from social and cultural fields to historical and geographical plans. In addition to this, the greater availability of sources and data easily accessible at the present made the assortment of variables to pick even broader.

The only thing clear enough about institutions is that their role is not univocal for economic systems, in all historical contexts, in all countries. Their role fundamentally depends on the perception that individual have of the institutions themselves and on the interactions institutions enable between agents, on their comprehension and acceptance, on community rules and numerous other factors characterizing the social texture of a defined group of individuals. In fact, though multiple differences in terms of institutions subsist between Germany and United Kingdom, Taiwan and Hong Kong, each of these countries has anyway reached high income per capita levels. At this regard Rodrik states: “*the economies that have done well in the post-war period have all succeeded via their own particular brand of heterodox policies*”<sup>5</sup>. This indicates that no homogenous institutions exist for producing the same effects in different countries and different contexts. The thing is even more evident comparing institutions in Latin American countries which adopted similar laws and solutions obtaining extremely different economic performances<sup>6</sup>. Even if institutions are the same created for accomplishing the same objectives with identical formal rules, reinforcing mechanisms, behaviors and ideologies may create huge differences among the same economic system.

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<sup>5</sup> Rodrik, 1999, “Making openness work”.

<sup>6</sup> Nugent and Lin, (1995), “Institutions and Economic Development”.

Economic agents frame of action and the configuration of a certain economic system come from the combined action of all institutions present in the correspondent environment, past and present, formal and informal, self-generated or created and so on. It is not for chance that all institutional performance indicators used in empirical studies so far show a strong correlation in the first instance between them and then with growth rates. It seems to be quite useless nowadays emphasize the role of one or another variable aggregated to form the institutional quality measure if all de facto present positive correlations with growth and development rates. For this reason the paper proposed will focus the attention on the individuation of just few institutional variables essential to jointly synthetize an index of institutional quality not only as a measure of dotation in a country of a certain number of variables but above all as a parameter of capacity embedded in the institutional framework, that is economic capacity of variables to favor or disfavor jointly growth or development in a country.

According to this particular view, institutional quality may represent a valid analytical instrument to be applied generally to the interpretation of different economic realities, improving coordination, perspective consistency and conceptual solidity. In this sense, it has been chosen to synthetize the institutional quality parameter as function of just three representative variables, singularly detectable for each country and susceptible to policies, jointly considerable as a minimal structure of the institutional framework, influential on the economic system both in terms of growth and development.

## **Empirical testing**

The impact of institutional quality on economic growth at different stages of development has been tested on a panel data containing observations from 1950 to 2009 referring to 181 countries through a pooled regression model and a fixed effects model.

All countries with available data, making exception for those whose GDP growth rate is too relied on oil exports<sup>7</sup>, have been included in the panel. Countries have been divided in “developing” and “developed” according to the classification given at this regard by the World Bank. In addition to this, a further differentiation has been made on the basis of a geographical criterion, following the seven regional categories offered by the World Bank: Sub-Saharan Africa, East Asia and Pacific, Europe and Central Asia, Latin America and Caribbean, Middle East and North Africa, South Asia, North America. Region dummies referring to the seven categories based on region do not affect the sample in size but they can filter out some effects not related to the variables of interest or the control variables included in the regression otherwise included in the estimation of their coefficients avoiding that factors specific to a region but not included in the model may be inaccurately absorbed by the estimated coefficients for the other variables included in the model. The data stretches from 1950 to 2009, so for each variable there are up to 60 observations per country. These observations have then been transformed into ten year intervals, where the value of the period is the average of the available observations to smooth the business cycle and get closer to the trend value of GDP changes. Furthermore, using longer time periods allowed to include more countries in the regression as developing ones lack observations for many years<sup>8</sup>.

As the basic hypothesis consists in stating that good institutional quality is positively correlated with economic growth so that, keeping all other factors constant, better institutional quality should determine higher growth levels, economic growth has been considered as dependent variable, while institutional quality as the independent one. Although it will be examined how different aspects of institutional framework affect economic growth at different stages of development, no hypothesis will be made on what those differences will be.

The GDP average annual growth rate has been used as proxy for economic growth, the dependent variable. Rather than trying to include as

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<sup>7</sup> Countries excluded from the sample due to their oil production as a fraction of GDP were Angola, Argentina, Azerbaijan, Algeria, Bahrain, Kuwait, Libya, Myanmar, Nigeria, Qatar, Iran, Iraq, Saudi Arabia and Yemen.

<sup>8</sup> As a rule, for all regression, observations where the residual differs from the estimated value more than three standard deviations have been removed.

many control variables as possible to increase the explanatory power of the model, the choice has been made trying to include as many countries as possible. Because data availability as far as developing countries are concerned turns to become significantly lower, it has been noticed that each added variable tended to disproportionately shrink the sample of developing countries compared to the one of developed. Control variables were therefore limited to three variables with high data availability: gross capital formation as a percentage of GDP as a proxy for investment; primary years of schooling as a proxy for education; number of telephone lines per 100 citizens as a proxy for infrastructure. As one of the tests performed on the dataset indicated that telephone lines per 100 citizens does not have a linear relationship to GDP per capita growth, the variable was transformed in logarithm solving the non-linearity issue of the regression. The data pertaining to the three control variables and the dependent variable come from the “World Development Indicators” database of the World Bank.

Nowadays a plethora of indexes attempting to proxy institutional quality exist and can be fit into different categories depending on institution types and definition but each institutional indicator is strongly connected to another. The truth is that more than a set of separate institutions, there are rather aspects of the same institutional environment that must be seen as an interwoven network where every thread contributes to the institutional framework and it is simultaneously affected by it. The three institutional indicators chosen to decline institutional quality, that are civil liberties, quality of government and number of veto players, offer the possibility to be changed through political action and all together provide a kind of litmus paper or microstructure of the institutional environment in its complex referring directly to citizens, government and their basic interaction.

The index used to approximate civil liberties comes from the Freedom House<sup>9</sup>. The mechanism through which civil liberties is expected

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<sup>9</sup> Freedom House is an independent watchdog organization that supports the expansion of freedom around the world. Freedom House supports democratic change, monitors freedom, and advocates for democracy and human rights. It is structured so that each country and territory is assigned a numerical rating-on a scale of 1 to 7 towards a survey made up of 15 questions, a rating of 1 indicates the highest degree of freedom and 7 the lowest level of freedom, these ratings determine whether a country is classified as Free, Partly Free, or Not Free. The civil liberties questions are grouped into four subcategories: Freedom of Expression and Belief, Associational and Organizational Rights, Rule of Law, and Personal Autonomy and

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to affect growth follows the reasoning that increased rule of law and lessened interference by the state will encourage the amount and quality of investment<sup>10</sup>. Because a higher score on the civil liberties index chosen implies lesser rule of law and freedom, the hypothesis is that civil liberties have a positive influence on growth, therefore the coefficient for civil liberties will be negative.

The index used to approximate legislative checks and balances comes from the Political Institutions database of the World Bank. Countries are scored depending on the number of player that can veto a law. The higher the score, the more checks and balances are provided by the legislative process and the stronger will be the institution. The hypothesis is that the number of checks and balances influences growth positively, therefore the coefficient estimated for number of veto players will be positive.

The index chosen to measure the quality of government comes from the International Country Risk Guide. It includes information about bureaucracy, corruption and stability across the country considered. As the higher the score, the higher is the quality, it is quite elementary at this point that the hypothesis in this case consists in affirming that quality of government affects growth in a positive direction, therefore the estimated coefficient will be positive. Because of the high degree of correlation between institutional indicators they will be examined in separate regressions. Two different models will be used to compare the impact of institutional variables on developing and developed countries: a pooled regression model and a fixed effects model. Both of them are based on ordinary least square regressions.

The pooled regression model will permit to quantify the differences between the estimated coefficients for the developed and developing countries, that is not only if an institutional variable is significantly correlated with growth but also to which extent its impact differs on the

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Individual Rights. Scores are awarded to each of these questions on a scale of 0 to 4, where a score of 0 represents the smallest degree and 4 the greatest degree of rights or liberties present.  
<sup>10</sup>Although there are of course individual exceptions to this, most notably China which has sustained a high growth rate for the past decades offering very few freedoms to its citizens, a theoretical basis for anticipating that civil liberties and growth have a positive correlation still empirically subsists.

basis of the development stage. Unfortunately, this model does not take into account the time-series in which data are ordinated and cannot examine more than one observation per country. In addition to this, it does not control for omitted variables and the Ramsey RESET test indicated that omitted variable were present in the specification of the model. For these reasons a fixed effects will be also used to supplement the pooled regression making the analysis more multifaceted. This method should produce greater accuracy in the estimated coefficients but the aspects related on development stages will be examined in three separate regressions, one for all countries, one for developed countries and one for developed ones. Together, the two models should offer a pretty strong basis for analysis of the effect that institutional quality has on economic growth. In order to check the suitability of the models to the data, different tests were performed. The Hausman test indicated that the fixed effects model was to prefer rather than random effect or between effects model. The residuals were tested for heteroscedasticity and muticollinearity, neither of which was indicated. The Shapiro-Wilks test for normality failed showing that data were not perfectly distributed. A further examination of residuals in graph form though did indicate that they were reasonably normally distributed. Because they are not statistically perfectly distributed, the p and f values provided by the regressions may show some statistical errors.

The pooled regression model is a linear ordinary least square estimation of panel data specified as follows:

$$\Delta y_{it} = \alpha + \beta_1 EDU_{it} + \beta_2 INFRA_{it} + \beta_3 INV_{it} + \beta_4 Dummy + \beta_5 (Dummy * INST^j_{it-1}) + \beta_6 INST^1_{it-1} + \beta_7 REG^1_{it} + \beta_8 REG^2_{it} + \beta_9 REG^3_{it} + \beta_{10} REG^4_{it} + \beta_{11} REG^5_{it} + \beta_{12} REG^6_{it} + \epsilon_{it}$$

Where  $\Delta y_{it}$  stands for the average annual growth in GDP per capita for country I during the time t,  $\alpha$  is a constant,  $EDU_{it}$  is a proxy for the investment in education in country i at time t,  $INV_{it}$  is the average yearly investment in real capital in country i at time t,  $Dummy$  is a dummy variable for development level where 1 signifies that the country is a developing country and 0 that it is a developed country,  $INST^j_{it-1}$  is a proxy for institutional quality j in country i at time period t-1,  $REG^1_{it}$  through  $REG^6_{it}$  are dummy variables for the geographic region of country i, the dummy

assumes value 1 if the country is located in that particular region, 0 if it is located in one of the other regions. The World Bank divides countries in seven regions but just six are included in the regression, the seventh serves as benchmark to compare the estimated coefficients of the other dummies.  $\varepsilon_{it}$  stands for the residual, the differences in economic growth that cannot be accounted for through the model.  $(Dummy * INST^j_{it-1})$  is the institutional variable  $j$  for the country  $i$  at the time  $t$  multiplied by the dummy for development category, it assumes value 0 for all developed countries and the value the institutional quality  $j$  at the time  $t$  for all developing countries  $i$ .

Because institutional quality is believed to influence economic growth partly through the amount of investment done, it could be interesting to orthogonalize the investment variable in order to filter out the effect of institutional quality on the investment variable itself. Aside from the investment variable, the model will be as in the previous version of the pooled regression model:

$$\Delta y_{it} = \alpha + \beta_1 EDU_{it} + \beta_2 INFRA_{it} + \beta_3 INV_{it}^{ortho} + \beta_4 Dummy + \beta_5 (Dummy * INST^j_{it}) + \beta_6 INST^j_{it-1} + \beta_7 REG^1_{it} + \beta_8 REG^2_{it} + \beta_9 REG^3_{it} + \beta_{10} REG^4_{it} + \beta_{11} REG^5_{it} + \beta_{12} REG^6_{it} + \varepsilon_{it}$$

The orthogonalized investment variable is obtained running a regression with the old investment variable as dependent variable and institutional variable as independent variable:

$$\Delta INV_{it} = \alpha^{ortho} + \beta * INST^j_{it-1} + \varepsilon_{it}^{ortho}$$

Adding then the constant to the residuals from each individual observation:

$$\Delta INV_{it}^{ortho} = \alpha^{ortho} + \varepsilon_{it}^{ortho}$$

The fixed effects model estimated a linear relationship between the dependent and the independent variables. It can be described as an OLS regression that includes a dummy variable for each individual country, eliminating country effects and controlling for the omitted variables on the estimated coefficients of variables included in the model. Consequently

three separate regressions will be run, one for all countries, one for countries classified as developed and one for countries classified as developing. The model is specified as follows:

$$\begin{aligned} \Delta y_{it}^{\text{all}} &= \alpha + \beta_1 \text{EDU}_{it} + \beta_2 \text{INFRA}_{it} + \beta_3 \text{INV}_{it} + \beta_6 \text{INST}_{it-1}^j + C_{it}^1 + \dots + C_{it}^{n-1} + \varepsilon_{it} \\ \Delta y_{it}^{\text{developed}} &= \alpha + \beta_1 \text{EDU}_{it} + \beta_2 \text{INFRA}_{it} + \beta_3 \text{INV}_{it} + \beta_6 \text{INST}_{it-1}^j + C_{it}^1 + \dots + C_{it}^{n-1} + \varepsilon_{it} \\ \Delta y_{it}^{\text{developing}} &= \alpha + \beta_1 \text{EDU}_{it} + \beta_2 \text{INFRA}_{it} + \beta_3 \text{INV}_{it} + \beta_6 \text{INST}_{it-1}^j + C_{it}^1 + \dots + C_{it}^{n-1} + \varepsilon_{it} \end{aligned}$$

All variables stand for the same as in the pooled regression. The variables  $C_{it}^1$  through  $C_{it}^{n-1}$  signify the dummy variables for all countries included in the regression minus one which serves as benchmark. Because of limited data availability, this model does not include enough control variables to completely control for all other economic conditions and other variables in the model may absorb the impact of omitted variables. In order for this model to completely filter out the effect of omitted variables, the sample should ideally have a relatively smaller amount of countries and a greater amount of periods<sup>11</sup>. This sample has five time periods available for each country but for many countries data unavailability limits the number of observations per country. Therefore independent investigation of developed and developing countries could potentially give us more accurate idea of different impact that institutional quality has depending on development status.

## Results

The overall evidence showed by the regressions is in line with the hypothesis that institutional quality has a significant positive impact on economic growth. This is true both for developing and developed countries. Of course the model is relatively basic and additional factors may change the results, nevertheless, there is at least some indication that the institutional indicators withstand robustness checks as they performed quite similar results under different economic conditions.

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<sup>11</sup> Princeton University, 2010, "Panel Data".

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Growth	Growth	Growth	Growth	Growth	Growth
Variables of Interest:						
CL*Dummy	0.108			0.110		
NoVP*Dummy		0.0738			0.0734	
QoG*Dummy			5.893***			6.208***
Control Variables:						
Civil Liberties	0.0360			0.0319		
Number of Veto Pl.		0.119			0.0889	
Quality of Gov. Dummy	-0.242	0.121	-3.330***	-0.242	0.170	-3.366***
Education	-0.184	-0.236	0.0724	-0.173	-0.212	0.0632
Infrastructure	0.156	0.0630	0.197	0.236*	0.124	0.238
Investment	0.154***	0.162***	0.151***	0.120***	0.137***	0.159***
Region:						
Europe & Cen. Asia	0.554	0.458	1.135**	0.482	0.388	1.059**
Lat. Am. & Carib.	-0.646*	-0.745*	-0.821	-0.671*	-0.831**	-0.870*
Mid. East & N. Afr.	-0.311	-0.0994	-0.338	-0.337	-0.177	-0.448
North America	-0.222	-0.319	0.777	-0.417	-0.502	0.736
South Asia	1.242**	1.007*	1.015	1.428**	1.040*	1.013
Subsaharan Africa	-0.807*	-0.721	-0.903	-0.810*	-0.800*	-0.887
Constant	-0.697	-0.549	1.534	-0.242	-0.146	1.306
Number of Obs.	406	385	216	413	390	218
R-squared	0.308	0.310	0.375	0.300	0.308	0.398
Notes: *** p<0.01, ** p<0.05, * p<0.1						

Table 1: Regression results from pooled regression model

Notes: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 1 shows the result from the pooled regression model. Each column contains information about the estimated coefficients of variables included in the regression. The orthogonalization of the investment variable had no impact on these results. The regressions that include civil liberties or

number of veto player indicate that the growth level is unaffected by development status as the coefficients for the development status dummy is insignificant, but often considerably affected by region. Characteristics peculiar to Latin America and Caribbean and Sub-Saharan Africa, omitted from the model, have a significant and strong negative correlation with economic growth. Factors specific to South Asia determine opposite effects. As far as quality of government is concerned, the results indicate that it has a greater positive impact on growth in developing countries than in developed ones, with 99% of significance. Because the development dummy is significantly and negatively correlated with growth, keeping all other things constant, developing countries are still likely to experience a lower economic growth. It is important to notice that a difference subsists in the number of observations between the three regressions. Quality of Government has fewer data available that decreased sample size. It is then possible that countries with lower quality of government score lower data availability but of course this cannot be known for certain. The orthogonalization of the investment variable did not bring to any substantial changes in the explanatory power of the model, nor in the F-test values, aside from more significance shown by region dummies for Latin America and Caribbean and Sub-Saharan Africa. So if it is true, as it seems looking at results, that institutional variables do affect economic growth, they do it not only due to the impact of investment.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES All Countries	Growth	Growth	Growth	Growth	Growth	Growth
Variables of Interest:						
Civil Liberties				-0.416*** (0.121)		
Number of Veto Flayers					0.431*** (0.121)	
Quality of Government						3.412* (1.997)

Control Variables:						
Education	0.437	-0.0220	0.728	-0.178	-0.0738	0.299
Infrastructure	-0.0189	-0.358	0.204	0.541***	0.503***	0.279
Investment	0.115***	0.104***	0.109***	0.126***	0.117***	0.187***
Constant	-3.127	1.212	-5.122*	0.889	-2.048	-6.140
Number of Obs.	552	285	267	409	387	219
R-squared	0.075	0.058	0.122	0.217	0.230	0.207
Number of Countries	166	83	83	156	149	119

Table 2.1: Results from fixed effects model regression

Notes: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

VARIABLES	(7)	(8)	(9)	(10)	(11)	(12)
	Growth	Growth	Growth	Growth	Growth	Growth
	Developed Countries			Developing Countries		
Variables of Interest:						
Civil Liberties	-0.372**			-0.462***		
Number of Veto Flayers	(0.184)	0.500***		(0.166)	0.322*	
Quality of Government		(0.166)	3.232		(0.181)	3.601
Control Variables:			(3.106)			(2.512)
Education	-0.316	-0.231	-1.324	-0.144	0.0209	1.911**
Infrastructure	0.392	0.508	1.682	0.575***	0.517**	0.0779

Investment	0.102**	0.0896**	0.174**	0.134***	0.129***	0.211***
Constant	1.746	-1.448	-1.467	1.595	-2.010	-15.47***
Number of Obs.	205	188	120	204	199	99
R-squared	0.100	0.146	0.232	0.321	0.301	0.333
Number of Countries	79	74	67	77	75	52

Table 2.2: Results from fixed effects model regression

Notes: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 2 displays the result of the fixed effects model, strongly in line with hypotheses presented before. The first hypothesis stated that civil liberties would have had a positive effect on economic growth. As the index used to approximate civil liberties assumes higher value when the country is less free, the estimated coefficient for civil liberties was expected to be negative. The evidence confirms it, not only when all countries are included in the regression but also when development categories are examined separately. The explanatory power of the model increases significantly for developing countries when civil liberties are added to regression, only moderately for developed ones. This could indicate whether civil liberties have an undeniably greater impact on growth in developing country, that is civil liberties have diminishing marginal effects and if they are scarce an extra unit will cause a greater effect than it would if civil liberties were already abundant, or that the civil liberties variable is highly correlated with other factors that affects growth in developing countries not included in the model. Anyway civil liberties are still positively correlated with growth. The second hypothesis stated that the number of veto players should have influenced growth in a positive direction and in fact the number of veto players is significantly positive both for all countries and the individual development categories. The estimated coefficient for the number of veto players is greater in size for the developed countries, as well as more significant. It is quite plausible thinking that checks and balances might reach a critical mass before becoming effective at promoting growth. The

third hypothesis stated that the quality of government would have had a positive effect on growth. The estimated coefficients for quality of government show p-values higher than 0.10 for developed and developing countries, while the estimated coefficient for all countries is significant with 90% certainty. In particular, the p-value for developed countries is 0.303, for developing countries 0.159 meaning that quality of government appears to be more significant in developing countries than in developed ones. However, a closer examination of the correlation tables reveals that in developed countries there is a high correlation between quality of government and infrastructure, whereas this correlation is significant lower for developing countries. Because of this, the p-values for both of these variables are likely to be very insignificant. Although the estimated coefficients seem to be insignificant, it must be noticed that the inclusion of quality of government in the model more than double the R<sup>2</sup> for developing countries and more than triples it for developed countries meaning that after all the relationship between quality of government and economic growth is not irrelevant.

	All	Developed Developing	
	(1)	(2)	(3)
VARIABLES	Growth	Growth	Growth
Quality of Government	4.293** (1.753)	5.322* (2.838)	4.068* (2.198)
Investment	0.214***	0.187***	0.245***
Education	0.236	-1.470	1.888*
Constant	-6.336	3.121	-16.28***
Observations	221	120	101
R-squared	0.207	0.194	0.316
Number of Countries	120	67	53

Notes: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 3:** Results from fixed effects model without infrastructure

Table 3 displays the effect of quality of government on growth if infrastructure is excluded from the regression. The  $R^2$  decreases for developing countries, increases for developed countries and remains the same for all countries. The p-values of the estimated coefficients are all lower but still positive, indicating a higher significance level. Because of the strong correlation subsisting between infrastructure and quality of government in developed countries but not in developing ones, but is difficult to state whether the effect of government differs depending on development category but quality of government is undoubtedly correlated with growth positively.

At last, in order to compare the effect of different institutional variables on growth, the size of the standard errors must be considered calculating what happens to economic growth when an institutional variable is increased with one standard error unit. For developing countries this experiment indicates that civil liberties has the greatest impact on growth, for developed countries the same can be said for the number of veto players.

If it is then true that growth rates are positively influenced by institutional quality, the possibility that the causality is reverse has not been disproven. It can be also argued that increased growth may lead to increased demand for more civil liberties and quality of government. A reasonable conclusion is that these two effects coexist and interact, pushing both growth rates and institutional quality higher than otherwise would be.

	All	Developed Developing	
	(1)	(2)	(3)
VARIABLES	Growth	Growth	Growth
Quality of Government	4.293**	5.322*	4.068*
	(1.753)	(2.838)	(2.198)

Investment	0.214***	0.187***	0.245***
Education	0.236	-1.470	1.888*
Constant	-6.336	3.121	-16.28***
Observations	221	120	101
R-squared	0.207	0.194	0.316
Number of Countries	120	67	53

Notes: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 4:** Results from fixed effects model without infrastructure

	Growth	CL	NoVP	QoG	Edu	Inf Inv
Growth	1					
Civil Liberties	-0.0575	1				
Number of Veto Players	0.1273	-0.6891	1			
Quality of Government	0.0208	-0.671	0.5391	1		
Education	-0.2745	-0.1446	-0.0179	0.0417	1	
Infrastructure	0.2458	-0.6733	0.4961	0.6883	-0.1551	1
Investment	0.4586	0.0247	-0.0025	-0.0047	-0.1714	0.2243 1

	Growth	CL	NoVP	QoG	Edu	Inf Inv
Growth	1					

Civil Liberties	-0.0994	1				
Number of Veto Players	0.1666	-0.5642	1			
Quality of Government	0.1396	-0.0443	0.2611	1		
Education	-0.4061	-0.0595	-0.1082	-0.149	1	
Infrastructure	0.4415	-0.2476	0.19	0.1902	-0.4269	1
Investment	0.5208	-0.0321	0.0651	0.0709	-0.3054	0.4856 1

	Growth	CL	NoVP	QoG	Edu	Inf Inv
Growth	1					
Civil Liberties	0.0772	1				
Number of Veto Players	0.0214	-0.6516	1			
Quality of Government	-0.1896	-0.6452	0.4956	1		
Education	-0.1692	-0.2558	0.0506	0.1575	1	
Infrastructure	0.0012	-0.5965	0.5073	0.7012	-0.0629	1
Investment	0.3645	0.159	-0.1349	-0.1372	-0.0515	-0.0489 1

**Table 4** Correlation, a) All countries, b) Developed countries, c) Developing countries

Summary Statistics, All countries

Variable	Obs.	Mean	Std. Dev.	Min	Max
Variables of Interest: <i>Civil Liberties</i>	425	3.770585	1.843124	1	7

	Number of Veto Players	393	2.466598	1.55258	1	9.4
	Quality of Government	224	0.5683979	0.2388691	0.0555556	1
Dependent Variable:	Growth	732	2.332316	2.620544	-3.992896	13.85329
Control Variables:	Education	595	5.820261	0.8769537	3	8
	Infrastructure*	687	1.373857	1.961378	-3.755724	4.478249
	Investment	651	22.77837	7.583052	5.360259	59.67432
Summary Statistics, Developing Countries Only						
	Variable	Obs.	Mean	Std. Dev.	Min	Max
Variables of Interest: <i>Civil Liberties</i>		215	4.807957	1.404028	1	7
	Number of Veto Players	205	1.744396	1.273582	1	9.4
	Quality of Government	102	0.4073917	0.152861	0.0555556	0.6944445
Dependent Variable:	Growth	342	1.794874	2.596304	-3.371875	13.37976
Control Variables:	Education	289	5.823183	0.8485581	3	8
	Infrastructure*	320	-0.155272	1.530686	-3.755724	3.204981
	Investment	321	20.9541	8.310051	5.360259	59.67432
Summary Statistics, Developed Countries Only						
	Variable	Obs.	Mean	Std. Dev.	Min	Max

Variables of Interest: <i>Civil Liberties</i>		210	2.708515	1.622607	1	7
	Number of Veto Players	188	3.254105	1.445098	1	7.8
	Quality of Government	122	0.7030097	0.213379	0.2222222	1
Dependent Variable:	Growth	390	2.803611	2.553257	-3.992896	13.85329
Control Variables:	Education	306	5.817502	0.9043337	3.4	8
	Infrastructure*	367	2.707158	1.15822	-1.973823	4.478249
	Investment	330	24.55288	6.327224	7.29257	58.96724

**Table 5:** Summary Statistics

## Conclusions

The aim of this paper was twofold pointing at analyzing the impact of institutions on economic growth as well as examining if the eventual impact differs depending on development degree.

In order to perform this task, two econometric models and three institutional indicators were used. The institutional indicators employed were civil liberties, number of veto players and quality of government. The two models were based on the ordinary least square regression: one of them included fixed effects and the other a dummy to investigate differences depending on development status.

The results support the main hypothesis, that is institutional quality do impact in a positive way on economic growth. This is true for all three institutional indicators that were examined. The only difference between how developing and developed countries are affected by institutional quality is in the size of the impact, not in the direction of it. On a more specific level, out of the three institutional indicators, improved civil liberties seem to perform a greater effect on economic growth in developing countries, whereas the number of veto players assumes more importance for developed countries economies.

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The strategic implication to be drawn is that institutions do matter for growth. However, it must be considered that all the empirical researches aimed at investigating the relationship between institutions and economic growth have still to face at least two kinds of problem upstream. The first difficulty is related to the determination of good institutional quality indicators: the impressive number of indicators elaborated by multilateral organizations, risk-rating agencies, academic institutions and non-governmental organizations, in fact, present ambiguous results stemming from endogenous variables or collinearity between them and they often lack a theoretical framework linking the indicator to previously defined institutional quality criteria. In addition to this, most of them just refer to the socio-political sphere neglecting the administrative one due to the impossibility to decline in a cross-country homogenous way variables pertaining to the various legal and juridical systems. The second problem is then represented by the definition of growth itself. Economic growth, in fact, is currently associated with GDP per capita, a useful tool to approximate growth trends easily comparable among countries and for these reasons for a long time worldwide accepted as indicator for well-being and development too. However, since the times are changed and the choice of any indicator is never neutral, policies aimed at merely increasing GDP levels may fail to meet social and policy objectives linked to well-being and sustainability, not to mention other GDP well recognized limits such as insensitivity to the distribution of income and inability to count goods and services with no market. Unfortunately finding new tools is not an easy task and the debate is still on. One thing is for sure, that is “we cannot face the challenges of the future with tools from the past<sup>12</sup>”

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## European typologies of time use – the social model approach

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*Starting from the fact that working time it is influenced by factors related to employment policies (especially for mothers), including those relating to extending or not of the working life and, on the other hand on social protection policies, the present paper presents typologies of working time use. Also taking into consideration the influence of social protection systems to Western European states we have defined and analyzed four types of social models: nordic social model, liberal social model, continental social model, mediterranean social model. As a conclusion of the analysis of the proposed social models we can observe that the EU states circumscribed social patterns, characterized by common general directions for time use, driven in particular by social protection systems and legislation on employment. Regarding the new Member States, both the countries joined the EU in 2004 and also Romania and Bulgaria, it appears that they have imposed their own social models and the time use, but taking items (some of them imposed by regulations) of models in EU countries with tradition.*

**Keywords:** social models, time use, time usage patterns

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## Introduction

Countries and companies that make up the world are characterized by a wide diversity regarding the economic development, but also by tradition, culture, population attitude to work and individuals- as elements that make up society - use their available time according to constraints derived from social and economic situation of the country in which they live and work.

A major concern for economic science it represents the way in which the available time it is "shape up" and determinants of this process, with particular emphasis on how "patterns of time use " are changing during life, especially the time segments allocated for work (paid and unpaid) as well as for leisure or education. This interest derives mainly from the changes that occur in:

- a) education (childhood and youth) and its duration;
- b) lifetime employment and time use pattern in this period;
- c) post-active period - elements fundamental related to the transformations and radical changes registered in economic systems (production, trade, etc)
- d) demographic evolutions(life expectancy increasing, aging, etc).

According to the European Foundation for the Improvement of Living and Working Conditions (2007), the time use patterns in general, the work time in particular are changing substantially during life.

## Typologies of working time use

Experience of European countries from the recent years highlighted the contradictory tendencies, generated one hand by factors related to employment policies (especially for mothers), including those relating to extending or not of the working life and, on the other hand on social protection policies. Regarding the work time, extremely important for economic and social development, the above mentioned paper discuss about three hypotheses of work, assimilated to the three phases of the life cycle of a person, these phases measured or analyzed in relation with the time allocated for work. These phases are:

- **Labor market entry phase** which usually is placed at the end of study period and in the first part of work life, which is estimated to be for people up to 35 years without children. In this period, the number of hours that young employees work are under the influence of several factors, most important factor being related with the characteristics of the formal educational system, especially the schooling and training period, which tends to prolong in the last period (with differences by country). The effect of this tendency may conduct to the decline in the employment rate of persons from this category and a smaller number of paid working hours.
- **The middle phase of life** (the busiest), in which the work occupy the most important place. At this phase the children appear which has to be carried out, and also appear elderly parents care situations or other life situations that differentiates the "model" of time allocation, especially between men and women. Given that this period of life the employees have childcare obligations, trends in employment and working hours can be very different. Thus, in the most prosperous countries in which mother's employment is encouraged (promoted by employment and social policy measures), the employment rates and working hours of mothers may increase. By contrast, in poorer countries, the situation may be different: either a high participation of women in the labor market whether it is actively encouraged by incentives provided by the social protection system, because of lower wages, being necessary two salaries for meet the needs of living, or poor participation of women, mainly because of constraints in the labor market (women are the first threat of unemployment) and / or their large family obligations, having bigger responsibilities for childcare and domestic activity. An important chapter of this phase of life refers to unpaid work. This problem is common in less developed European countries, especially those in transition. It is known that in these countries, especially Romania, a considerable amount of production is for "subsistence", which is associated with unpaid work to overcome the lack of employment in paid jobs and lack of cash income. Beyond this characteristic, social protection for this category of

workers it is very low, which customizes the pattern of time use in these category countries.

- **Late or final phase**, which is placed in the last part of working life before retirement age, but after that age when some of those who belong to this segment can and are willing to devote some time to work. Many European countries, especially the highly developed and with a powerful aging population, discourage the early retirement and encourage late retirement. In these countries, the trend is to reduce lower employment rates and the number of working hours. Conversely, are differences between countries regarding the use of available time by people who work beyond age. In a country where there is no social protection scheme for people who reach active age limit or part of they benefit of social protection (e.g. pensions), although theoretically individuals are out of the labor market, basically they are forced to continue in countries where such measures are lacking, the employment rates of people in this stage of life fall quickly, especially if this situation it is supported, in part, by the provisions of the pension system, with early retirement trend, more pronounced among women. Regarding the amount of unpaid work of people in this age group, it depends on several factors, in which the operation of adequate social protection for the elderly (pension and health care) and strong family relationships play an important role. Women in this age provide a substantial amount of unpaid work, mainly to support their children and for activities in their households.

In the following, we are presenting some of the most significant "models" of time to use grafted or associated with European social models. The complexity of the characteristics of a society imposed by the institutional structures and social protection systems, the rules and regulations relating to employment, social policies, etc., define a social model and time use pattern is contoured based on existing social model. In general, social protection systems, together with schemes they function, put their mark on the social model and thus on the time use at national level.

Time is an important element that must be taken into account when trying to assess individual welfare. For example short term unemployment may affect the economic welfare of an individual and its family but can not erode

its initiative to seek another job. On the other hand, long-term unemployment could cause a negative attitude towards work, which affects preoccupations and reduces the individual skills. Moreover, unemployment benefits granted for long a time can make from unemployed status an easier alternative to obtain income. In these circumstances, the time that should be allocated for work on the labor market is wasted, substituting in other forms, most often in the household or informal labor market. Thus, the personal consequences are negative (low pay, low-growing opportunities in professional plan, social dissatisfaction related to professional status, etc...), but also the national economy. Romania has serious drawbacks compared to neighboring states with a similar political situation and economic system and especially with the very developed states of the EU (Tabel 1.)

When referring to another important social protection scheme, pensions, we can see that there working to secure an income. Their available time is - in this case - reallocated mainly for reallocate the time, especially for leisure activities, active rest and voluntary social activities. Depending on the support of social protection systems to Western European states have defined four types of social models (Table 2.); work, whether it is paid or works in the household. At the opposite pole is the population of northern EU countries (Denmark, Finland and Sweden), countries characterized by strong social protection systems. Pensioners in these countries enjoy much greater freedom to:

- **Nordic social model:** Denmark Sweden, Finland
- **Liberal social model:** Ireland, Great Britain
- **Continental social model:** Austria, Belgium, France, Germany, Holland
- **Mediterranean social model:** Greece, Italy, Portugal, Spain.

To characterize patterns of time use in all European Union countries, we will take into consideration the results of a study conducted recently by the European Foundation for the Improvement of Living and Working, which conducted a statistical survey on the quality of life in Europe ( European Quality of Life Survey) in 28 countries<sup>1</sup>. The research included key aspects of life quality, as the country's economic situation, housing and environment,

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<sup>1</sup> In EU member states and Turkey

employment and training, household and family structure, balance between work and private life, health and health care, subjective welfare and society quality. Based on the results, in 2007, European Foundation for the Improvement of Living and Working Conditions published a report focused on time use throughout life. The report examines the use of working time in terms of employment rate for the three stages / phases of life:

F1: Young age phase (15-24 years), the corresponding to the entry of population on the labor market;

F2: Peak active age phase (25-54 years), corresponding to a maximum in the use of time for work;

F3: Late phase of active life (55-64 years).

The report delimits the work time usage patterns in Western European countries, grouped in four models, the countries joined the European Union in 2004 and, separately, in Bulgaria, Romania and Turkey. We are presenting in Table 1 the main types of social models in Europe and some derived aspects – regarding the time use, particularly working time.

**Table 1:** General aspects regarding the time use (working) in Europe, in relation to existing social models and labor market

	<b>F1: Young age phase (15-24 years)</b>	<b>F2: Peak active age phase (25-54 years)</b>	<b>F3: Late phase of active life (55-64 years)</b>
<b>Nordic model</b>	Years of study average is high in all three Nordic countries (18 - Denmark, 19 - Finland, 20 years - Sweden), but the time allocated for education combined with paid work time is a common practice (especially in	High rates of employment, which leads to high use of working time Policies regarding the working time are taking into consideration the reducing of working hours (in the present, the standard working	In Denmark and Sweden, retirement age is higher than most European countries (in Denmark - 65.3 years for men and 62.1 years for women), being a growth factor for the time available for work at the

	Denmark)	week is 40 hours).	national economy level.
<b>Continental model</b>	In Austria and the Netherlands, the young people enter into the labor market early (from 16 years in Austria. In Germany, young people use their time for work and education, the assertion being supported by high employment rate among young people (46.9%), with a relatively high proportion of young people enrolled in education (17.9%).	The average length of working week is moderate in most countries from this group. Minimum values are recorded in the Netherlands (40.6 hours) and France (40.7 hours). Characteristic to the continental European countries is the high rate of part-time employment among women (from 23% in France, 60% in the Netherlands), which increases the national fund of working time.	Potential time work it is not grabbed like in the Nordic countries. For the population of 55-64 years, occupancy rates registered the lowest levels in Europe (in Belgium, 37.8%, 18.7% for men and women) Also, retirement age is lower (58.5 years for men, 56.8 years for women)
<b>Liberal model</b>	In Anglo-Saxon countries, young people devote a significant part of the time available for work: youth participation in the labor market is high both in the UK (52.4%) and	Flexible labor market is very active in this segment of the population and the average working week is high (e.g., 43.7 hours in Britain, compared with	Both countries have a high participation of people in this age group in the labor market (64.6% in the UK, 64.6% in Ireland). Adding to this aspect a high average of

	Ireland (45.9%), mainly due, a relatively low average length of schooling (17 years in Ireland).	41.7 hours, the EU average). Employment part time work is widespread, especially among women (44.2% in the UK and 31.3% in Ireland).	retirement age (in Ireland, 65.2 years for men, and 66.2 years for females), factors that contributes to the fund for potential employment
<b>Mediterranean model</b>	There are difficulties in terms of youth entering into the labor market, even for those with a high level of education. With the exception of Portugal, the unemployment rate exceeds 20% of the population under the age of 25 years. The phenomenon affects the fund of available time for work	Countries of southern Europe are characterized by low employment rates. However, the average working week is high (44.3 hours in Greece).	Compared with the Nordic countries or in the liberal model in southern European countries, employment rates are lower for the group 55-65 years of age (42.8% in Italy for men and 18.5% for women).
<b>EU member states from 2004</b>	Employment among young people is very low in almost all ten countries joined the EU in 2004. The phenomenon	Countries joined the EU in 2004 are characterized by high rates of unemployment (especially Poland, Slovakia and	In Slovenia, Poland and Hungary, the employment rates are low for the population aged 55-64 years (under

	may be associated with a high unemployment for people under the age of 25 years and less to a longer period of schooling.	Latvia). Some states have relatively large periods of the working week (Czech Republic, Latvia, Poland and Slovenia). Part-time employment is insignificant in almost all ten countries.	40% even for men). At the opposite end are the Czech Republic and Estonia (58.9%).
<b>EU member states from 2007</b>	Both countries (Romania and Bulgaria) are characterized by lower average length of schooling (15 years). However, employment among young people is low, adversely affecting the national fund of time available for work.	In Romania, the average working week is 40.5 hours. Data for Romania show an employment rate (83.5%) below the European average. In Bulgaria, the employment rate is lower (69.3% for men).	Less than half of 55-64 people are employed in the labor market. In Romania, for example, the situation is explained by early retirement. Also an important part of the population in this age group is retired through illness

## Conclusions

As can be seen from the summary presented in Table 1, the EU states circumscribed social patterns, characterized by common general directions for time use, driven in particular social protection systems and legislation on employment. Indicators on which time use models were defined, in relation with the social models and employment patterns reflect

primarily the minimum age for entry into work market, the maximum age of retiring, labor market and work programs flexibility, level of employment, etc.

Regarding the new Member States, both the countries joined the EU in 2004 and also Romania and Bulgaria, it appears that they have imposed their own social models and the time use, but taking items (some of them imposed by regulations) of models in EU countries with tradition. The reasons are related, in particular, that historical situation, social, cultural, political, economic, that the population (size and composition) in a country determines the way in which people "consume" (use) the time for work or for other activities

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## The Appropriate Model and Dependence Measures of Thailand's Exchange Rate and Malaysia's Exchange Rate: Linear, Nonlinear and Copulas Approach

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The objectives of this study are to find the fitting model and dependence measures of both Thailand's exchange rate and Malaysia's exchange rate during, between, and after the World's recent financial crises based on linear, nonlinear and empirical copula approaches.

The results of the study confirm that the nonlinear model (NNTs) is an appropriate model for Thailand's exchange rate return in percentage during the periods of 2008-2011 but not for Malaysia's exchange rate return. Based on empirical copula approach, the dependence measures are very small between Thailand's exchange and Malaysia's exchange. This seems to suggest that when global economy is affected by World's financial crisis, the nonlinear approach should be used to predict Thailand's exchange rate return in percentage. In addition, it suggests that both the nonlinear and linear approaches should be used to predict the Malaysia's exchange rate return in percentage. Moreover, the relationship between the exchange rate of Thailand and that of Malaysia is not strong. This is also true for the currencies of both countries.

**Keywords:** *Linear, Nonlinear, Copulas, Exchange Rate, Thailand, Malaysia  
The Appropriate Forecasting Model*

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## Introduction

This research on Thailand's exchange rate return in percentage and Malaysia's exchange rate return in percentage focuses on the appropriate model and dependence measures in response to: 1) AR-linear models (Autoregressive-Linear models), (GM) traits and issues of coexistence, 2) SETAR models (Self-Exciting Threshold Autoregressive models), 3) LSTAR models (Logistic Smooth Transition Autoregressive models), 4) NNTs model (Neural Network Models), 5) AAR model (Additive Autoregressive models) and 6) Empirical Copula Approach. The selected data used to forecast is the actual daily data during the periods of 2008 to 2011. The mixed model consisting of linear model, nonlinear models and copulas approach was employed to looking for of both Thailand's exchange rate return in percentage and Malaysia's exchange rate return in percentage during the specific period.

## Research Objective

The specific objective are to find an appropriate model and dependence measures of both Thailand's exchange rate and Malaysia's exchange rate during, between and after the World's recent financial crises based on linear, nonlinear and empirical copula approaches.

## Scope of this research

The daily data of both Thai's exchange rate and that of Malaysia's exchange rate reported by the Reuters data based during the periods of 2008 to 2011 were used in this study.

## The research framework and methodology

The research framework and methodology used in this research are those used by Antonio and Fabio Di Narzo (2008) and presented in their paper entitled "Nonlinear autoregressive time series models in R using tsDyn version 0.7" in which both the linear and nonlinear approaches were

estimated by R-project. The copula concept used in this research follows that in Sklar's theorem (Sklar, 1959).

- **Autoregressive-linear model (AR-linear Model)**

The basic linear models is AR(m) model and can be written as shown in equation (1).

$$y_{t+s} = \phi + \phi_0 y_t + \phi_1 y_{t-1} + \dots + \phi_m y_{t-(m-1)} + \varepsilon_{t+s} \quad (1)$$

The equation (1) represents the AR(m) model and  $y_t$  is time series data at time  $t$ ,  $\phi$  is parameter and coefficient of  $y_t$  in the model. In addition,  $\varepsilon$  is error term of this equation.

- **Self-Exciting Threshold Autoregressive Model (SETAR Model)**

The general Self-Exciting Threshold Autoregressive Model or SETAR model can be written as shown in equation (2).

$$y_{t+s} = \begin{cases} \phi_1 + \phi_{10} y_t + \phi_{11} y_{t-1} + \dots + \phi_{1L} y_{t-(L-1)} + \varepsilon_{t+s} & z_t \leq th \\ \phi_2 + \phi_{20} y_t + \phi_{21} y_{t-1} + \dots + \phi_{2H} y_{t-(H-1)} + \varepsilon_{t+s} & z_t > th \end{cases} \quad (2)$$

The equation (2) represents the SETAR models and  $y_t$  is time series data at time  $t$ ,  $\phi$  is parameter and coefficient of equation (2). In addition,  $\varepsilon$  is error term of this equation and  $Z_t$  is a threshold variable in the model. The  $L$  represents lower regime of model and  $H$  is represented the higher regime of the model.

- **Logistic Smooth Transition Autoregressive Model (LSTAR Model)**

The general Logistic Smooth Transition Autoregressive Model or LSTAR model can be written in equation (3).

$$y_{t+s} = \frac{(\phi_1 + \phi_{10} y_t + \phi_{11} y_{t-1} + \dots + \phi_{1L} y_{t-(L-1)}) (1 - G(z_t, \gamma, th))}{(\phi_1 + \phi_{10} y_t + \phi_{11} y_{t-1} + \dots + \phi_{1L} y_{t-(L-1)}) (1 - G(z_t, \gamma, th)) + (\phi_2 + \phi_{20} y_t + \phi_{21} y_{t-1} + \dots + \phi_{2H} y_{t-(H-1)}) G(z_t, \gamma, th)} + \varepsilon_{t+s} \quad (3)$$

The equation (3) represents the LSTAR model and  $y_t$  is time series data at time  $t$ ,  $\Phi$  is parameter and coefficient of equation (3). In addition,  $\varepsilon$  is error term of this equation and  $Z_t$  is a threshold variable in the model. The L represents lower regime of model and H represents the higher regime of the model. Moreover,  $G$  is the logistic function and  $\Phi, \gamma, \theta$  are parameters to be computed.

- **Neural Network Models (NNT Model)**

The form of the neural network model was used for estimation in this research and can be explained by equation (4).

$$y_{t+s} = \beta_0 + \sum_{j=1}^D \beta_j g(\gamma_{0j} + \sum_{i=1}^m \gamma_{ij} y_{t-(i-1)d}) \quad (4)$$

The equation (4) represents the NNT model and  $y_t$  is time series data at time  $t$  the  $\beta_0$  is parameter of equation 4. In addition,  $D$  is a hidden units and activation function  $g$ .

- **Additive Autoregressive model (AAR Model).**

The generalized non-parametric additive model (Generalized Additive Model) or AAR model can be written as shown in equation (5).

$$y_{t+s} = \mu + \sum_{i=1}^m s_i(y_{t-(i-1)d}) \quad (5)$$

The equation (5) represents the generalized non-parametric additive model and  $y_t$  is time series data at time  $t$ .  $S_i$  are smooth functions represented by penalized cubic regression.

- **Dependence Measures and Copulas**

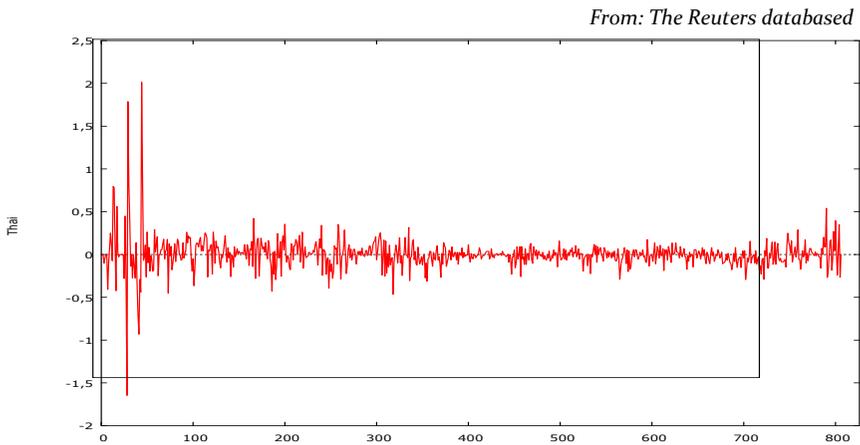
The general properties of dependence measures can be explained by the 4 items properties shown below (Embrechts, Lindskog, and McNeil (2003)):-

1.  $\delta (X,Y) = \delta (Y,X)$ .
2.  $-1 \leq \delta (X,Y) \leq 1$ .
3.  $\delta (X,Y) = 1$  if X and Y are comonotonic; as well as  $\delta (X,Y) = -1$  if X and Y are comonotonic.
4. If T is exactly monotonic, then  
 $\delta (T(X),Y) = \begin{cases} \delta (X,Y), & T = \text{increasing} \\ -\delta (X,Y), & T = \text{decreasing} \end{cases}$

Normally, the Pearson linear correlation fits only the first two properties but the rank correlation measures Spearman's rho and Kendall's tau fits all of the 4 properties. Therefore, the Copulas uses the Spearman's rho and Kendall's tau to calculate the dependence measures between X and Y which are random variables.

### Data description

Figure (1a) presents Thailand's exchange return in percentage during the period of 2008 to 2010 by daily data. And Table (1a) shows descriptive statistics of Thailand's exchange return in percentage from the specific period. Moreover, Figure (2a) presents Thailand's nominal exchange from the period of 2008 to 2011.

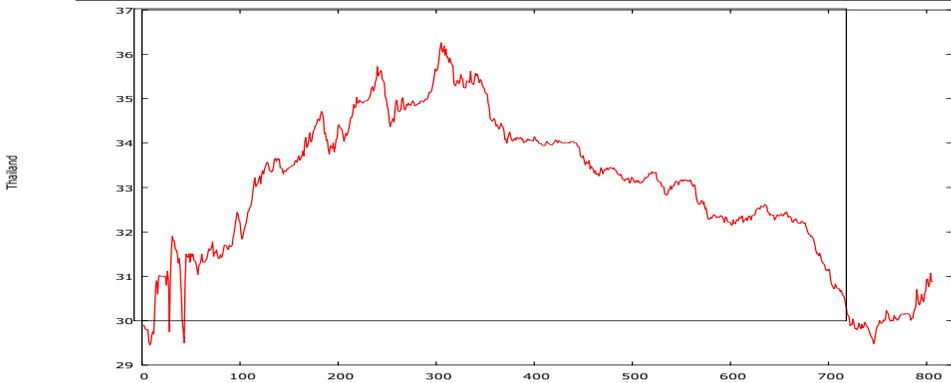


**Figure (1a):** Thailand's exchange return in percentage from the period of 2008 to 2011

**Table (1a):** The descriptive statistics of Thailand's exchange return in percentage from the period of 2008 to 2010.

*From: The Reuters data base*

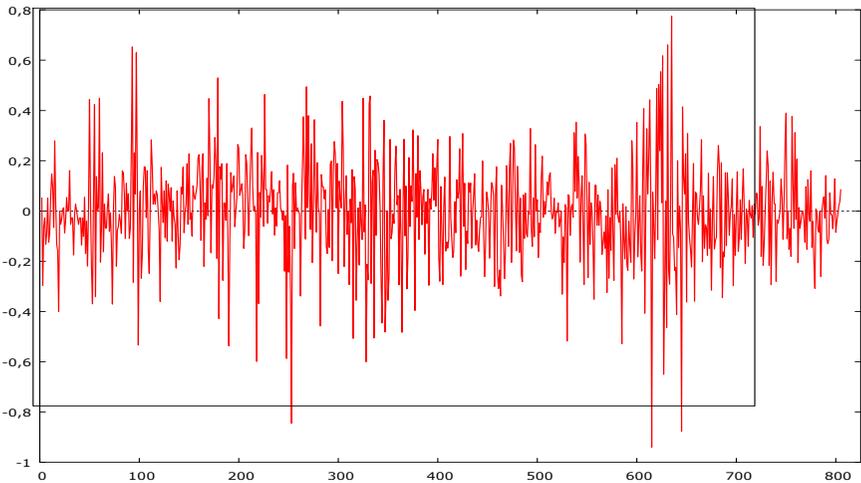
Item	Thailand's exchange return in percentage
Mean	0.0017399
Median	0.000000
Maximum	2.0136
Minimum	-1.6472
Std. Dev.	0.18062
Skewness	2.1367
Kurtosis	41.126
Number	806



**Figure (2a):** Thailand's nominal exchange from the period of 2008 to 2011

Figure (1b) presents Malaysia's exchange return in percentage during the period of 2008 to 2010 by daily data. And Table (1b) shows

descriptive statistics of Malaysia's exchange return in percentage from the specific period. Moreover, Figure (2b) presents Malaysia's nominal exchange from the period of 2008 to 2011.

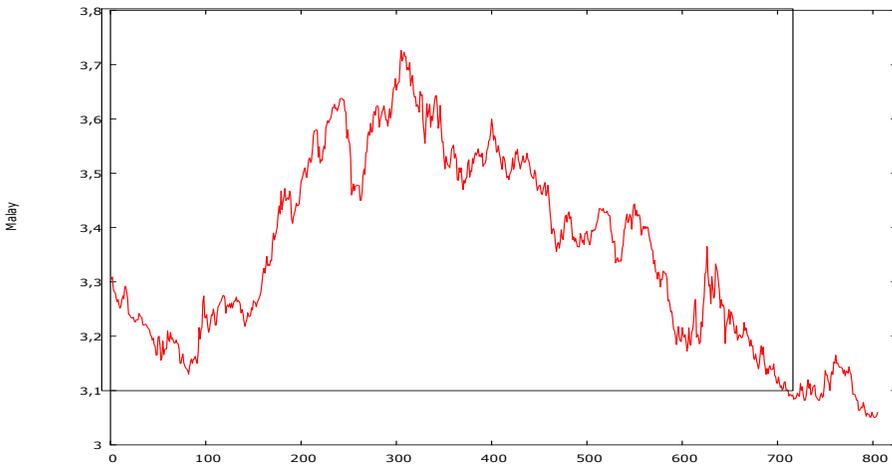


*From: The Reuters data base*

**Figure (1b):** Malaysia's exchange return in percentage from the period of 2008 to 2011

**Table (1b):** The descriptive statistics of Malaysia's exchange return in percentage from the period of 2008 to 2010.

Item	Malaysia's exchange return in percentage
Mean	-0.0041605
Median	0.000000
Maximum	0.77566
Minimum	-0.94036
Std. Dev.	0.19615
Skewness	-0.24013
Kurtosis	2.2359
Number	805



From: The Reuters data base

**Figure (2b):** Malaysia’s nominal exchange rate from the period of 2008 to 2011

**Empirical results of research**

- **The appropriate model of Thailand’s exchange rate returns in percentage based on both AIC and BIC**

Table (2a) presents the varieties of model estimated by linear and nonlinear approaches. The model selection based on both AIC and BIC was conducted to look for an appropriate model of Thailand’s exchange rate returns in percentage. It has been found that the Neural Network Models is the appropriate model succeeded in minimize of AIC and BIC.

**Table (2a):** The model selection of Thailand’s exchange rate returns in percentage based on both AIC and BIC

Items	Autoregressive Linear Models (AR)	Self-Exciting Threshold Autoregressive models) (SETAR)	Logistic Smooth Transition Autoregressive models (LSTAR)	Neural Network Models (NNETs)	Additive Autoregressive models. (AAR)

<b>AIC</b>	-2760.830	-2762.458	-2761.994	- 2894.2 00	-2889.379
<b>BIC</b>	-2746.758	-2729.622	-2724.468	- 2833.21 9	-2800.253

Source : From computed

- **The appropriate model of Malaysia's exchange rate returns in percentage based on both AIC and BIC**

Table (2b) presents the varieties of model estimated by linear and nonlinear approaches. The model selection based on both AIC and BIC was conducted to look for the appropriate model of Malaysia's exchange rate returns in percentage. Based on the comparison, the Self-Exciting Threshold Autoregressive model has been found to be the appropriate model succeeded in minimize of AIC. However, based on BIC, the Autoregressive Linear Models is the appropriate model succeeded in minimize of BIC.

**Table (2b):** The model selection of Thailand's exchange rate returns in percentage based on both AIC and BIC

<b>Items of the models</b>	<b>Autoregressive Linear Models (AR)</b>	<b>Self-Exciting Threshold Autoregressive models (SETAR)</b>	<b>Logistic Smooth Transition Autoregressive models (LSTAR)</b>	<b>Neural Network Models (NNETS)</b>	<b>Additive Autoregressive models. (AAR)</b>
<b>AIC</b>	-2619.086	-2622.011	-2613.606	- 2615.151	-2592.686
<b>BIC</b>	-2605.017	-2589.184	-2576.089	- 2554.18 7	-2503.584

Source: From computed

- **The dependence measures of Thailand's exchange rate in percentage and Malaysia's exchange rate in percentage based on the Empirical copula approach.**

Table (2c) presents the dependence measure of Thailand's exchange rate in percentage and Malaysia's exchange rate during the period of 2008-2011 based on the empirical copula estimated. The Kendall's tau statistics of dependence measure between Thailand's currency and Malaysia's currency is 0.08576576. In addition, The Spearman's tau statistics of dependence measure between Thailand's currency and Malaysia's currency is 0.1294213 (see more detail in appendix A).

**Table (2c):** The dependence measure of Thailand's exchange rate and Malaysia's exchange rate during period of 2008-2011

Comparison of the correlation items based on empirical copula approach	Thailand's exchange rate and Malaysia's exchange rate (Dependence Coefficients)
Kendall's tau statistics	0.08576576
Spearman's rho statistics	0.1294213

*Source: From computed*

## Discussion and Conclusions

In conclusion, the study aims to find an appropriate model and dependence measures of both Thailand's exchange rate and Malaysia's exchange rate during, between, and after the World's recent financial crisis (2008-2011) based on both linear and nonlinear analysis. The empirical results of the research indicate that the Neural Network Models is the appropriate model for Thailand's exchange rate return in percentage during

period of 2008-2011. However, it cannot be concluded that the linear or nonlinear approaches are the appropriate model for Malaysia's exchange rate return in percentage during the same periods of exploration.

In case of dependence measure based on empirical copula approach, it can be concluded that the correlation between Thailand's currency and Malaysia's currency is very small. If these results to be generalized for the future especially during the period of the global financial crisis, the nonlinear approach should be used to predict the Thailand's exchange rate return in percentage. In addition, both nonlinear and linear approaches should be used to predict the Malaysia's exchange rate return in percentage during such period. Moreover, the relationship between the exchange rate of Thailand and that of Malaysia is not strong in the specific periods of exploration. And, this is also true for the currencies of both countries.

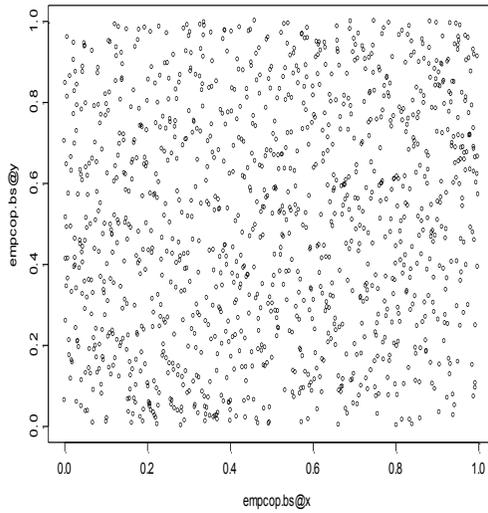
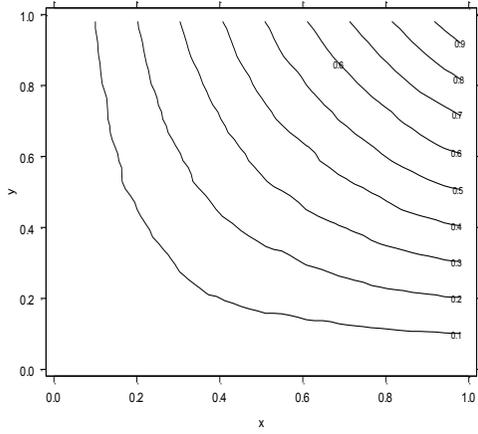
## References

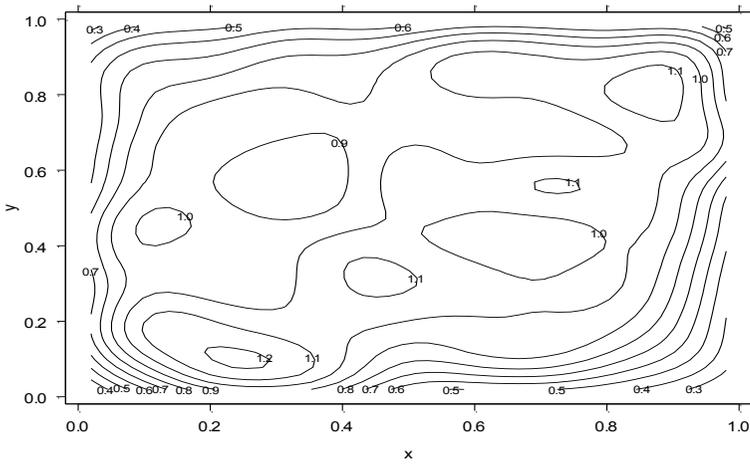
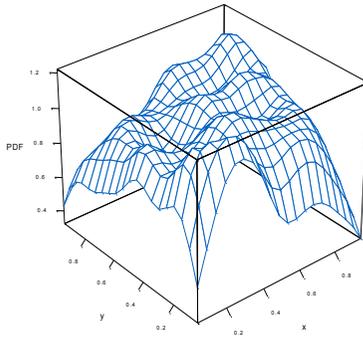
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## Appendix A

**Empirical copula for Thailand's exchange rate ( $y$ ) and Malaysia's calculated GPD marginal.**





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## Designing an Effective Female Leadership Model in Governmental Organizations

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*Since leadership is a critical factor for improving organizational performance, failure or success of an organization highly depends on the efficiency of leadership at all levels. Scholars elaborated that leadership is the ability of influencing one's attitudes, aptitudes and beliefs, in the way that it will lead to meet organizational objectives. The main purpose of this study is to consider two domains of efficient leadership and women's leadership style, in order to determine and elaborate the dimensions of the new concept of "Women's Efficient Leadership". We intend to describe the characteristics of women's efficient leadership in state organizations in Iran by means of offering a logical pattern, in order to be able to propose a favorable pattern, leading to increased efficiency in governmental organizations of the country. Innovation of this study can be divided into two parts: one is theoretical contribution and developing the knowledge of efficient leadership as well as women's leadership style, and the second one is scientific contribution and proposing a pattern for women's efficient leadership in state organizations, using compound approach. The outcomes of this study show that women's efficient leadership in state organizations consists of 7 subjects, 17 dimensions, and 85 components, which represent various characteristics in different periods of time. The thesis that women's efficient leadership has an evolving nature was approved and that it consists of a combination of factors such as capability of*

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*team making, having vision, cognitive and psychological capabilities, able to bring continuous improvement of organizational performance, mentoring and making effective relations. In this study, the influence of mentioned factors on women's efficient leadership has been investigated by means of questionnaires and has been approved.*

**Keywords:** *efficient leadership, factors on women's efficient leadership, women's leadership, compound approach*

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## Introduction

The difference in social status and modes and individuals' expectations from women lead to unfair prejudice in people's behavior concerning women. Since the second half of the twentieth century, through expansion of urbanization, education, communication technology, democracy, and improvement of women's awareness of their status and position, they have become more alert about participating in social, economic, cultural, scientific, political affairs as well as managerial fields (Maleki, 1999, P.64).

By improvement of industries and prevalence of business in social life, women were involved in initiating businesses or taking managerial offices in large organizations alongside men and even with much more speed, in a way that according to the statistics women's taking managerial offices in large organizations in USA and Europe has increased more than 20% and the number of businesses started by women has increased more than 30% in the recent past 20 years (US Bureau of Labor Statistics, 1982:2002).

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Given this trend, many of the leadership researchers have concluded that female leadership style is more advantageous, thus, female leadership style is more effective than masculine leadership under the new and changing conditions of the world. Having the rise of women in leadership in mind, it is obvious that the prejudices and clichés about women and their role in the society have undergone change and revision. This is not only compatible with freedom and equality of women and men, but as the result of an ideal leadership style has been studied by researchers (Furst and Reeves, 2008).

On the other hand, although leadership has been the focus of the organization researchers for many years, the significant social, political, and economic changes during the last two decades has led to the growing importance of the discussion of effective leadership (Duckett and Macfarlane, 2003). Therefore, the presence of women in organization and using effective leadership styles can promote the function of the organization, and on this basis, the objective of this paper is to find appropriate answers for the following questions:

1. What is the nature of effective leadership of women?
2. What are the components of female effective leadership style in governmental organizations of Iran?
3. What is the relationship and position of each of the components of female effective leadership style in governmental organizations of the country?
4. How important are the components forming the female effective leadership style in governmental organizations of the country?

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## Literature Review

### Theoretical Framework of the Paper

Whereas, organizing and starting a case study without having a theoretical framework results in storytelling, therefore, a theoretical framework was considered in order to enrich the report findings, organizing the interviews, collecting and management of the data and not to exercise any research design orientation. The framework was based on the teachings of Effective Leadership of Harvi (2004), this framework has been chosen for its comprehensiveness in applying for all variables in the past researches. In this way, the suggested theoretical framework consists of the ten main "factors of" vision, perspective, inspiration, group empowerment, team building, deep attraction, coaching, constant improvement of organization performance, concentration on self and others knowledge, establishing effective relationship, and personal and psychological characteristics. In fact, it is believed that all issues related to female effective leadership could be summed up under aforementioned 10 factors. The mentioned subjects were set as the basis of designing open questions from experts and collecting required data.

### Traditional Approach to Female Leadership in Organization

Many people believe that female leaders in organizations are not able to meet leadership requirements due to differences from men, and because of the stereotypical beliefs about different characteristics of men and women, it is expected that these beliefs affect the female and masculine leadership style and behavior. In fact, it is assumed that female and male

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leaders adopt leading styles according to the stereotypical beliefs attributed to them (Sczensy, et al, 2004). Therefore, masculine characteristics are emphasized and it is believed that men can meet effective leadership requirements better than women (Brown, 1979).

In non-Islamic communities, only the women of New Zealand had achieved equal political rights by the beginning of twentieth century. By the beginning of First World War, by conferring equal political rights to the women of Australia, Finland, and Norway, the number of such countries reached to four. During the period from 1918 to 1939 other 19 countries recognized the political rights of women, Soviet Union (1917), Germany (1918), UK (1919), and United States (1920). The French and Italian women also achieved their rights on the first years of World War II, and gradually began to enter managerial areas in different organizations (Maleki, 1999, p. 49).

According to the traditional approach, it is believed that female leaders use a more versatile strategy for appointing employees objectives and influencing the team performance in organization. It is also said that women are more conservative and make use of coalition to achieve their goals. In the traditional framework, a successful middle manager must have characteristics and attitudes that are more masculine (Chapman, 1975). It is expected that women adopt different behaviors in giving bonus, employee promotion, meet their needs, and they tend to have promotional policies (Catalyst, 2001; Terborg, 1977). This prediction is the basis for traditional female leadership framework. A summary of the authors' opinions is provided in table 1:

**Table 1:** Summary of the authors' opinions of traditional female leadership in organization approach

Researcher	Research findings
Chapman <sup>1</sup> (1975)	Because of the stereotypical beliefs about different characteristics of men and women, it is expected that these beliefs affect the female and masculine leadership style and behavior.
Eskilson and Wiley <sup>2</sup> (1976)	The characteristics of most women are not compatible with the expectations of a leader or desired director in an organization. Therefore, it is not possible for most women to achieve leading position and/or an important position in a managerial hierarchy.
Brown <sup>3</sup> (1979)	Compared to men, the female leaders who have executive activities tend to encourage inter individual relations less. Additionally, it has been proved that compared to men, women are more concentrated on their tasks (more task oriented).
Ashmore <sup>4</sup> et al (1986)	Women and men have different characters, behaviors, and needs. Different skills have been recognized for men and women. It is believed that men are independent, realistic, and competitive. On the other hand it is also said that most women are sentimental, affectionate, and passive, these characteristics are evident in the leading style of men and women.
Eagly and Johnson <sup>5</sup> (1990)	Women, especially in elite executive positions, tend to show characteristics that are masculine. This occurs especially when female leaders work in a company or

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	industry where the majority of people are men.
Senge <sup>6</sup> (1990)	According to the traditional approach, leadership is defined based on authority and power. In this regard also, men are more capable than women.

### **New Approach to Female Leadership in Organizations**

With expansion of urbanization, complexity of human relation, growing of literacy rate, explosion of communications and information technology, the tendency to employing women in leading organizations has increased, in a way that it has turned to be the main issue of discussions in directing organizations (Smith, 1997). Since the second half of the twentieth century, especially the last twenty years due, to expansion of this mode of management we are witnessing more presence of women in works outside home, specifically in factories, production and trading companies, and gradually women obtained higher levels in the hierarchy of the organizations. According to the statistics of the Bureau of Labor of the United States, women held only 18% of managerial and administrative positions in the United States in 1982; by 2002 that percentage had increased to 40%. This indicates that women's share has increased by two times during the past 30 years (U.S. Bureau of Labor Statistics, 1982:2002). Eagly and Carli (2003) also indicate that gender gap is being narrowed down and women almost hold half of managerial and administrative positions, and they believe that women are more successful in international economy.

Finally, it is expected by lapse of time a greater number of women take up managerial positions in the organizations; as according to Fortune

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500 (500 top US companies<sup>6</sup>) in the past decade the number of female directors in the organizations has increased 5 times (Wolfe, 2010).

Women by creating a sense of community, better communication with employees, and listening effectively had better qualifications for acquiring leadership in modern organizations (Eagly and Carli, 2003). In postindustrial societies, leaders share power far more and establish many collaborative relationships with the employees. Therefore, contemporary views of effective leadership in organizations encourage teamwork and collaboration and emphasize the ability to empower, support, and engage workers that is congruent with the ways that women lead (Hammer and Champy, 1994). Women have greater social skills compared to men and are more successful in establishing congeniality. Female leaders, also, are more successful in empowering the employees, and can establish more effective communication and listen effectively (Fondas, 1997).

Conlin<sup>1</sup> (2003), having investigated the schools of thought related to women and organization leadership, argues that due to characteristics and capabilities of female leaders in the organizations many people have attested to the effectiveness of female leading and emphasizes that the evident female leadership qualities can be used by men in the organizations to improve the performance and they are not exclusive for women.

To address these issues, researchers must confront the perennially important issue of what behaviors characterize effective leaders. Is it the firm execution of authority over subordinates or the capacity to support and inspire them? And concluding the support and inspiration leads to effectiveness in organization (Wolfers, 2006; Chemers, 1997).

Vecchio (2002) believes that historically, leadership has been construed as primarily a masculine enterprise, and many theories of

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leadership have focused on the desirability of stereotypically masculine qualities in leaders. Nevertheless, it is probable that stereotypically feminine qualities of cooperation, mentoring, and collaboration are important to leadership as well, certainly in some contexts and perhaps increasingly in contemporary organizations. He describes female leadership advantages and sees the following items the reasons for rise in female leadership:

1. Nowadays women enjoy more awareness and rights compared to past.
2. The leading roles and tasks are different from the past.
3. The activities of the organizations have changed.
4. The culture has changed.

Therefore, on the whole it could be concluded that not only the organizations and their leading roles have changed in a way that they depend less on hierarchy, but also women have changed due to more freedom in society and higher education in a way that makes them suitable option for leading organizations in modern societies (Smith, 2002). In other words, researchers believe that the effective leading style is more like female leadership style and they believe that female leadership style is more flexible (Rosener, 1995; Helgesen, 1990). Also, Wolfers (2006) believes that in fact, women tend to be more cooperative than being power oriented.

### **Research Methodology**

The present paper falls under the applied research category. Also, as to the manner of gathering the data (research design) regarding the newness of the concept of female effective leadership and the need to know its nature and quality, explaining the effective components and their relations in the said

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realm, mixed research was applied. In the qualitative part we collected qualitative data. In quantitative part, we used survey research method.

In the qualitative part of the research the sample are effective leadership experts. In this paper, the expert is the one who has authored several books about leadership in governmental organizations, taught in university, and has the record of 15 years of serving in a governmental organization. In the quantitative part of the sample all the managers and employees were the object of case study. In qualitative method sampling is limited, and sampling was exercised to the stage of saturation, by preparing a list of the experts by the researchers, then they were called and informed of the topic of the meeting, then meetings were held in their work place or other places and open and half structured interviews were carried out. Finally, 18 people of the experts cooperated in this research and the data was saturated. Then using pair comparative questionnaires the experts' opinions about the definition of the importance and weight of the analyzed components were gathered. In the quantitative part, regarding the limited number of employees and members of the organization under study (the statistical society included 2713 people), the statistical sample of the research was obtained equal to 337 according to Kokran equation. In this equation measurement error ( $\epsilon$ ) which shows the accuracy of estimations was considered 5 percent and assurance level equal to 0.95, therefore the amount of (Z) will be 1.96, also in order to maximize the volume of the samples the amounts of p and q were considered 0.5. The questionnaires were distributed among the chosen people and 307 questionnaires were returned (return rate 91%). In the qualitative step the sampling method was purposeful, in a way that a list of all experts was made and they were informed of the time and topic of the meeting. In the quantitative step,

sampling method is randomly classified. The number of the sample is provided in table 2 according to the organizational position.

**Table 2:** Sample volume composition

<b>Organizational Position</b>	<b>Quantity</b>	<b>Percentage</b>
Companies		
Managers and supervisors	54	18%
Employees	253	82%
Total	307	100%

In the qualitative stage of the research in order to access reliable literature concerning leadership, the existing sources on reliable websites were used. As multiple and confirmation sources the documents related to female effective leadership existing in governmental organizations were gathered. In quantitative stage the data was collected from the questionnaires filled by the managers and employees. The measurement scale of the questionnaire was Likert scale 5 that the respondents answered in the scale of complete agreement to complete disagreement. In the qualitative stage, the repeatability or reliability of the research was increased by documentation of the data and methods while conducting the plan and using qualitative standard methods and the validity of the research was determined by consulting with experts who have full knowledge of the components of female effective leadership. In the quantitative stage, the Cronbach Alpha method was applied in order to calculate the reliability of the measurement tool. The amount Cronbach alpha is 0.96. It should be noted that the validity of the questionnaire was evaluated by the experts on qualitative stage.

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## Data Analysis (Research Findings)

In the qualitative stage data analysis was carried out by open and axial coding, some of the codes or in fact the themes and concepts were drawn directly from the text of the interviews, and others, in the form of researcher made, were drawn from regarding the themes and concepts drawn from the review of the theoretical basics and leadership and management of women in governmental organizations literature and evidences and findings of the obtained documents (default codes or researcher made codes), and were brought out in the form of current forms in order to reflect the points of the respondents. In the form that according to the described theoretical framework, the subject categories were chosen and after classification and management of the data the default theoretical framework was adjusted and 10 subjects shrank to 7 subjects. Thus, the factors of perspective, insight and inspiration were narrowed down to perspective; the factors of constant group empowerment and team building to ability to team building; the factors of deep attraction and concentration on self and others knowledge to a new factor under the title of cognition power. These classes, which were considered according to the subject coding, were selected from the raised issues for conducting the interviews. After determining the classes or subject codes, we drew out the open codes, which according to the qualitative analysis were directly taken from the sayings of the interviewees, and in fact have direct relation with the sayings of the interviewees. After open coding, in the next step that is through axial coding, we tried to choose main and manifest themes and concepts from among the open codes, to choose those codes that are capable of manifesting and covering other codes and formation of subjects. In fact, if

we consider the open codes as minor concepts and themes, the axial codes play the role of general structures or concepts. It should be explained that in this research the analysis and collection of data are done simultaneously in a circular process. The matrix structure of the data analysis and information about the components of female effective leadership in governmental organizations were drawn from the interviews that are shown in table 3 due to limitation of presenting in the form of subjects, dimensions and components, together with weight and importance of each one of the subjects, dimensions and components.

**Table 3:** components of female effective leadership in governmental organizations (subjects, dimensions and parts)

Component	Dimensions	Parts
Perspective (0.123)	Perspective (0.243)	The ability to present a desirable picture of the organization's future among the colleagues
		Recognition of opportunities for organization's growth and development in future among the colleagues
		Knowledge of organization's strategies and making them clear for the employees
		Making the necessity of change in employees
		Knowledge of organization's mission and making them clear for the employees
		The ability to present a desirable picture of the organization's future among the colleagues
	Inspiration (0.421)	The ability to persuade the managing board of the organization to accept a desirable future for organization
		The ability to create common language among the colleagues along with the organization's development in future
		Being optimistic concerning making change and conveying it to the employees
		Inspiring bonus winning for the services and cooperation of the employees
		Creating favorable atmosphere for increasing knowledge and development of individual skills of the employees
		Presenting new ideas for exercising the organization's activities
		Creating favorable atmosphere for developing individual skills of the employees

		Welcoming the employees' criticism about one's performance	
		Encouraging the colleagues to collaborate in change improvement	
	Holism (0.336)	The ability to motivate the employees to do activities more than what they did before	
		Firm faith in the organization's mission	
		The ability to keep a big picture in mind	
Team building power (0.132)	Constant group empowerment (0.343)	Conferring group bonus to the members of the groups and active and creative units	
		Encouraging the colleagues to constant improvement of group collaboration	
		Bounding to act according to collaborative leading style	
		Creating and enhancing cooperation spirit and coherence among groups of organization	
		Boosting the power of decision making power of the group members for improving the group performance	
		Identifying and offering constant study opportunities for the colleagues	
		The ability to create a creative atmosphere for the employees	
		Bestowing adequate power to the groups of organization	
	Team building and team work (0.336)		The ability to identify the elite and qualified employees
			Attracting the skillful employees to operate the organization's affairs
			Appointing experts in managerial positions
			Appointing capable and acceptable people by the employees for managerial positions
			Appointing employees according to their specialty in specialized positions
	Joint action (0.321)		Encouraging others to move along with the common goal in a team work
			Liking people instead of objects and enhancing managerial collaboration
	Cognition (0.194)	Deep attraction (0.143)	The ability to secure the confidence of the employees and board of directors
			Observing justice and fairness when confronted with the problems of the employees
Having scientific competence in the specialty field of the organization			
Having scientific competence in administration of the organization			
Serious efforts to fulfill the objectives of the organization and its growth and development			
Being multitask (0.421)			Understanding the diversities of the organization simultaneously and applying them
			Understanding the contradictions of the organization simultaneously and applying them

	Social awareness (0.436)	The ability to influence the employees Appropriate reaction for identification		
Psychological ability (0.100)	Functionality & advocating order in org. (0.544)	Trust and commitment		
		Honesty and trustworthiness in attitude and speech		
	Leadership competence (0.465)	Being prepared to confront power		
		Having a great deal of perseverance and endurance		
	Ability of knowing oneself and employees (0.301)	The ability of knowing oneself and employees		
		The ability of learning from the experiences and improving oneself and promoting it in organization Learning from the successful experiences of the colleagues to improve one's performance		
Constant improvement of organization performance (0.112)	Performance evaluation (0.387)	Constant effort to improve one's professional and job skills		
		Apprehend the importance of using suggestion system and making use of its results to improve one's job tasks		
		Planning for constant improvement of performance		
		Establishing a comprehensive job performance evaluation system to assess the productivity of the colleagues		
		Serious efforts to produce high quality products and desirable services		
		Making use of the experiences and new methods used by other organizations		
	Constant improvement (0.312)	Performing active role in fast and effective transfer of new knowledge & information in the body of the organization		
		Constantly identifying the pros and cons of org. performance using the method of knowing the performance results		
		Eliminating the discriminations between the colleagues and observing justice and fairness in making decisions related to the human resources under supervision		
		Conducting constant and informal assessment and evaluation of the job performance of the colleagues		
		Empowering for adaptation of the inner changes of the organization with the expectations of the society		
		Evaluating the performance of the educational groups and different university units		
		Coaching (0.187)	Coaching (1.000)	Creating necessary facilities for the colleagues to access university management
				Helping the colleagues to improve their performance
Introducing new thoughts for doing research among the colleagues				
Hard work for the growth and progress of the colleagues and nurturing the feeling of self-leadership in them				

Establishing effective relations (0.152)	Building relations (0.587)	Establishing effective and intimate relations
	Conversation (0.413)	Effective listening
		Appropriate and flexible speech making
		The ability to hear and express the pros and cons of the organization simultaneously

After finding the components, pair comparison questionnaire was designed to determine the weight and importance of each one of the components, then they were given to the experts and the results were entered into Expert Choice 11 software. The software determined the weight status of each component according to the hierarchy logic. The weight and importance of each component is shown in table 3. In the quantitative stage, the suggested pattern was analyzed using Lisrel software to establish a causal relationship between the independent and dependent variables. In causal patterns, first of all the prototype must be tested, for this purpose different criteria on pattern fitness were used. In this paper also many criteria were used that the results are shown in table 4. As see in this table all fit indexes confirm the pattern. Generally, if the value of GFI is greater or equal to 0.98, it indicates suitable fitness of the pattern. On the hand RMSEA must be lower than 0.05 and its confidence interval should not be very much, which is almost 0.035 in this pattern. Moreover, the amounts of NFI, CFI and RFI show the satisfactory level of the pattern, which are greater than 0.9. The CMIN as the most important index for determining fitness was lower than 2 and equal to 1.57, which is in a suitable domain.

**Table 4:** Pattern fitness indexes

Index	Acceptable Limit	Obtained Score
CMIN	Lower than 2	1.57
RMSEA	Greater/equal to 0.98	0.98
CFI	Greater than 0.9	0.96
RFI	Greater than 0.9	0.98
NFI	Greater than 0.9	0.98

After logically proving the pattern fitness by the data, the meaningfulness of the pattern components and the relations between the variables were evaluated. Generally, the latent variables (the identified factors in the qualitative research) explained 89 percent of dependent variable variance of female effective leadership in the case study. In other words, this pattern shows that 89 percent of the female leadership factors were effective, explain it, and they are identified and 11 percent of the effective factors were not identified. The results of the factor analysis and new factors are provided in table 5.

**Table 5:** Factor Analysis Results

Row	Factor	Variance %	Accumulated Variance %
1	Perspective	13.843	13.843
2	Team building power	12.027	25.87
3	Cognition power	14.459	40.329
4	Psychological power	12.701	53.03
5	Constant improvement of performance	11.008	64.038
6	Coaching	12.589	76.627
7	Establishing effective relations	11.981	88.608

## Conclusions

In order to create the possibility of comparing the findings of this paper with the findings of other researchers which were mentioned before, we can say that in this research unlike most of the previous researches, the maximum meaning of the female effective leadership was considered and the forming measures of female effective leadership was operationally conceptualized. Also, we avoided mere theoretical description of the subject that leads to defected validity. On the other hand the designed pattern is

not only limited to female leadership in organization but also can be applied by men, too, that is by nurturing the presented characteristics in this pattern in men, their performance would improve. Many researchers including Rosener<sup>1</sup> (1995), Helgesen<sup>2</sup> (1990) and Book<sup>3</sup> (2000) predict that female leadership can be the supplement of effective leadership for more success of the organization.

Therefore, proper answers were provided for the raised questions and assumptions regarding the said issues in the research methodology section of the paper and because of the execution of combined research. Thus, in the qualitative section of the research the components of the pattern were drawn out. To answer the first question of the paper it should be said that seven components of the female effective leadership pattern in the governmental organizations were drawn out.

To answer the second question, it was explained that research too was determined from the default theoretical framework and finally from the adjusted framework in the previous section. In a way that the forming elements of the female effective leadership includes 7 subjects, 17 dimensions and 90 parts that show different features in different periods. Meanwhile, in the quantitative stage we investigated the components using confirmatory factor analysis, that the results of factor analysis shows that 89 percent of the factors are influential on the main variable.

To answer the third question, concerning the "the position of each element in the forming pattern of female effective leadership" we can illustrate it in a three- level- pattern as shown in figure 1. In a way that the first level is the indicator of the subjects, the second level is the indicator of the dimensions and the third level is the indicator of parts. It should be noted that the concepts of each one of the mentioned dimensions in different stages depends on the specific conditions of that period and are manifested in the said parts. However, because of the limitation of illustration of the 90 parts we bring only the first level.

**Figure 1:** The position of each element in the forming pattern of female effective leadership



To answer the fourth question, we graded and determined the weight and importance of each component in the qualitative stage that the importance and weight of each one of the factors was drawn out by hierarchy analysis and is shown in table 3.

## Suggestions

In the end given that the present paper is the first study on identifying the components of female effective leadership pattern, the following suggestions are offered to develop and deepen this new knowledge:

1. Conducting exploratory researches using other qualitative research strategies;
2. Conducting research on businesses created and managed by women;
3. Exercising the findings of the present research in independent businesses and allowing the possibility of comparison;
4. Exercising the findings of the present research in men's leadership in governmental organizations and allowing the possibility of comparison.

In addition to the said theoretical suggestions, in the end some other practical suggestions for the use of the governmental organizations are offered as follows. It should be noted that the purpose of this paper is to offer a novel pattern of the female effective leadership in the governmental organizations of the country and it seems that this style of leadership is the developed form of effective leadership pattern that the organizations can use according to the global changes. Thus, this style is not exclusive to women and any organization willing to prosper can benefit from it:

1. Boosting these components in women and teaching men to learn them;
2. Supporting female leadership in governmental organizations in order to empower the state organizations;
3. Eliminating the negative atmosphere related to female leadership in governmental organizations;
4. Conferring authority to women in governmental organizations;
5. Extending the office of women as leaders and managers in governmental organizations to benefit from the positive results that bear fruit in long term;
6. Explaining the components of female effective leadership pattern by introducing successful cases in governmental organizations and encouraging managers to make use of this pattern.

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# Foreword

The current phase is characterized by the fully justified bafflement of the Europeans: Euro, where to?

The utopian construction (according to different opinions, not few in number) regarding the assessment according to which the euro zone represents an optimal economic area, begins to show some cracks.

Successive meetings, at the highest European level, of the representatives of the European economic power have shown concern about Europe's future in the euro zone. Why and particularly why now? The economic crisis does not alleviate and European reasoning is poor being insufficiently adapted to the crisis. Overcoming the national egoism becomes an imperative which must be respected and the economic solutions require a policy with a unitary content.

The international banking risk is due mostly to the flow of paper banknotes instead of the real ones. If, to this, we add the escalating and prevailing inclination toward consumption capitalism at the expense of productive capitalism, the crisis movie is complete and in progress. The financial stability of the world is based on continental policy measures adapted also to the national interest of each state. Who would favour the disappearance of the euro zone? Could it be the four year period too short for demonstrating the viability of a project so audacious? The alarming economic situation of some European countries that demand continuous consistent financial support displeases the rest of the European population. Europe has to overcome an "historical" challenge. Keeping intact the euro area calls for all practical, political and economic reasoning efforts. Otherwise, according to some estimates, domino effect would be recorded, extremely rapid. Therefore regaining the confidence of the Europeans falls within the implementation of a package of measures that will stabilize and renew the hope.

*Professor Mariana Iovițu, Ph.D.*

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