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From the Editor

Dear Readers, I acknowledge the worthy contribution of all the authors and friends of our Journal. Their commitment to the Journal has been expressed in variegated forms throughout the development of this academic journal edition summer 2007.

A special “thank you” is extended to the many academics who consciously serve in the Editorial Board. Appreciating the role of the Editorial Board for the successful development of our Journal, I am alert in continuously enriching the Editorial Board with academics from the areas of sciences which our Journal covers. Thus, in the current edition the Editorial Board is enriched with the participation of new academics from the areas of Humanities and Social Sciences, Information and Engineering Systems, Management, Leisure, Tourism and Hospitality, Accounting, Economics, Finance and Marketing. Namely, Anton Anthonissen and Paul Verweel of the University of Utrecht, the Netherlands, Caroline Ann Wiscombe of the University of Wolverhampton, the UK., Constantinos-Vasilios Priporas of Athens Graduate School of Management, Greece, Costas Zafiroopoulos of the University of Macedonia, Thessaloniki, Greece, Vasiliki Vrana of the Technological Educational Institute of Serres, Greece, Vasilios Grammatikopoulos of the Thessaly-TEFAA, Trikala, Greece, Evangelos Charos of Merrimack College, the USA, Graham Orange of Leeds Metropolitan University, the U.K., Kalliope Agapiou-Josephides and Savvas Katsikides of the University of Cyprus, Cyprus, Marianna Sigala of the University of the Aegean, Greece, Sofiane Aboura of Essec Business School, France and Suzanne Gatt of the University of Malta, Malta.

Taking this opportunity, I welcome all academics who would like to serve in the Editorial Board of our Journal as reviewers.

In this edition of *The Cyprus Journal of Sciences*, an impressive variety of articles is presented that should be of interest to readers due to their insights into theoretical issues in various scientific areas, their innovative methodologies and the substance of their findings. I truly believe that you will find them interesting. I also believe that to a great extent we have achieved our goal in shortening the time that elapses between acceptance and publication of articles.

Our next aim is to increase the number of articles that will be published from the areas of Humanities and Social Sciences as well as from the Pure and Applied Sciences.

I express my appreciation and my best wishes to all the contributors and readers of *The Cyprus Journal of Sciences*.

Charalambos N. Louca

ROLE AMBIGUITY AMONG GREEK ATHLETES

GEORGE KARAMOUSALIDIS^{*}, EVANGELOS BEBETSOS^{**}, KONSTANTINOS
LAPARIDIS^{***} and GIANNIS THEODORAKIS^{****}

ABSTRACT

The purpose of this study was to investigate the use of the questionnaire of Role Ambiguity, (Beauchamp, Bray, Eys and Carron, 2002), in offensive and defensive responsibilities, of Greek Team Sports' athletes, by checking its structural validity and reliability. The sample consisted of 409 athletes: basketball (n = 125), volleyball (n = 103), handball (n = 75) and soccer (n = 106). Reliability analysis, confirmed satisfactory Cronbach's alpha rates from .76 to .86. At the same time through factor analysis but also through confirmatory factor analysis four factors were discovered: The Scope of the Responsibilities, Role Behavior, Role Evaluation and Role Consequences both in offending and defending, which explains the 63% and the 70% of the total variation correspondingly. In conclusion, the results confirmed the reliability and structural validity of the questionnaire regarding its use in Greek Team Sports' settings.

Keywords: Offense; Defense; Role Ambiguity; Team Sports.

1. INTRODUCTION

Role Ambiguity has been defined as the lack of clear, consistent information regarding the expectations associated with one's position, Kahn, Wolfe, Quinn, Snoek and Rosenthal, (1964). It has been described as the single or multiple roles that confront the role incumbent, which may not be clearly articulated (communicated) in terms of behaviors (the role activities or tasks/priorities) or performance levels (the criteria that the role incumbent will be judged by).

Alike, Naylor, Pritchard and Ligen (1980), stated that role ambiguity exists when focal persons (role incumbents) are uncertain about product – to – evaluation contingencies and are aware of their own uncertainty about them.

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There are some speculations that role ambiguity has some multidimensional capacities, Bedeian and Armenakis (1981), Sawyer (1992), Singh and Rhoads (1991), Singh, Verbeke and Roads (1996). Based on these projects four dimensions of role ambiguity were displayed. These dimensions include: (a) target ambiguity/responsibility prospect (what to expect), (b) process ambiguity (how should things be done, the path for the target format), (c) order ambiguity (when should things happen and with what command) and (d) behavior ambiguity (how a person is expected to act in various situations).

According to Banton (1965), a 'role' can be defined as a group of models or expectations that are applied to the holder of the role and all the various play roles (sender role). The roles are mentioned in a total of expectations relative to behaviors for a part into the social structure, Shaw and Constanzo (1982), Sherif and Sherif (1953) and it's a special feature of the teams, Salas, Dickinson, Converse and Tannebaum (1992), Sherif and Sherif (1969).

The Role Episode Model was introduced by Kahn, Wolfe, Quinn, Snoek and Rosenthal (1964), into their classical study *Productive Anxiety*, in which are presented the interaction between the sender role and the holder role. They (Kahn, Wolfe, Quinn, Snoek and Rosenthal 1964), clarify that the role model is divided in two directions – dimensions. The first one concerns responsibility ambiguity which is divided in three subcategories: a) ambiguity for the responsibility field, to wit the lack of definitude for the responsibilities, b) ambiguity for behavior responsibilities which are necessary to fulfill the expectations and c) ambiguity for rank importance of every responsibility. The second dimension that was admitted by Kahn and his colleagues is social – emotional ambiguity. Generally this one is for the ambiguity concerning the psychological consequences and the discomfort that maybe a person will experience if he fails to fulfill the obligations of his part.

A great part of this research has shown that Role Ambiguity may have problematic consequences for the role incumbents. For example, in the area of business and organizations, role ambiguity has been confirmed to have negative influence, Lagace (1988), Terry, Nielsen and Perchard (1993), negatively connected with the satisfaction of work, Babakus, Gravens, Johnston and Mociief (1999), Rhoads, Signh and Coodwell (1994), O' Ddriscoll and Beeher (2000) and the devotedness, Agarwal and Ramaswami (1993), Colareli and Bishop (1990), Mayer and Shoorman (1998), as well as to drive the employees into exhausted performance resulted from labor (burnout), Bauer and Green (1994), Sohi, Smith and Ford (1996), Szilagyi (1977), Williams, Podsakoff, and Huber (1992).

Jackson and Schuler (1985) discovered that role ambiguity is associated with disappointment in industrial settings, as well as increasing tension/anxiety/escapism and diminished commitment and complication to the job/system. Recently, Beard (1999) repeated the point that the presence of role ambiguity is the reason of many

negative and damaging consequences, such as diminished satisfaction from labor, increasing levels of anxiety and greatest prospect to leave the body/system.

The initial reports of role ambiguity as mentioned, involved organizations and businesses and not small dependent groups such as labor groups or sport teams. Newman and Wright (1999) defined that groups are distinguished from the high differentiation of targets and the handing experience. Since role ambiguity has great consequences to organizations and businesses, it may also have implications for sport teams (Forsyth, 1999).

So, role ambiguity could be predicted to influence the thoughts and the behaviors of the role owner and other people, for example some group members. Consequently, role ambiguity could have psychological (self-efficacy, satisfaction) and behavioral implications such as performance (Forsyth, 1999).

Therefore, for the teams, psychological tactics intended to reduce not only role ambiguity but also the conflict of roles for the effective function of teams and “Every athlete knows what he has to do in each given situation, this is brought aboutby building on a basic philosophy so that he can make decisions at the time when he needs to” (McConnell, 1999, p.146). Despite the obvious efforts to control and diminish role ambiguity into the sports teams, very little research is published that has tried to examine methodically the concepts of roles into those teams.

Kahn, Wolfe, Quinn, Snoek and Rosenthal (1964) and King and King (1990) have tried to approach the multiple dimensions of role ambiguity and role conflict. Also, through their research, Beauchamp and Bray (2001) have examined the perception of athletes for role ambiguity and role conflict, using university elite athletes from a representative sample of dependent sport team. The results showed that the athletes, who had the highest levels of role ambiguity and role conflict, had presented lowest levels of efficacy regarding the accomplishments of their main responsibilities of their part.

Another research of Eys and Carron (2001) has examined the relation between role ambiguity, task cohesion and efficacy, in six university basketball teams. It was found that individuals who were confused for their role responsibilities believed that their team was less united regarding the approach to the team game and reported lower levels of attraction to their team.

According to the findings of Beauchamp and Bray (2001), individuals who had great ambiguity were less effective in accomplishing the responsibilities that were related to their responsibilities towards their team. Beauchamp and Bray (2001) who were using the project of Rhoads, Singh and Goodell (1994) and Singh (1993) as a base, estimated role ambiguity regarding sports to two main contexts: offense and defense. The results of Beauchamp and Bray (2001) supported their proposition that these two contexts formed definite distinguishable dimensions of team play for each team member, as role ambiguity perceptions were found to differentiate across contexts.

Eys and Carron (2001), using the theoretical model of Kahn, Wolfe, Quinn, Snoek and Rosenthal (1964) as their base, described role ambiguity as a multidimensional form that consists of ambiguity, a) to the *Scope of responsibilities*, that is mentioned in lack of plain information for the width of someone's responsibilities, b) *Role behaviors* that is mentioned in lack of plain information for the behaviors that are related to the part of someone, to wit which behaviors are necessary to do those obligations, c) *Role evaluation* that is mentioned in lack of plain information regarding the way that roles are evaluated and d) *Role consequences* that are mentioned in lack of plain information for the consequences of a failure to achieve the responsibilities of the role.

The research by Beauchamp and his colleagues (2002) on rugby athletes used the Role Ambiguity Scale (RAS), with the four dimensions, (*scope of responsibilities, role behaviors, role evaluation and role consequences*) in regard with role efficacy and role performance in offense and defense. Role Ambiguity was assessed using two 20-item scales (i.e. one for offense and one for defense) designed to assess the degree of ambiguity and lack of clarity associated with: (a) the scope of personal responsibilities (5 items), (b) the behaviors necessary to carry out those responsibilities (5 items), (c) how performance associated with those responsibilities is evaluated (5 items), and (d) the consequences of a failure to successfully carry out those responsibilities (5 items).

The confirmatory factor analysis using the statistical AMOS, Arbuckle (1999) supported the structural validity of the questionnaire. The multiple dimensions of role ambiguity explained the contradiction related to the efficacy and the performance. According to the theories of Bandura (1997) and Kahn, Wolfe, Quinn, Snoek and Rosenthal (1964), negative relations that exist into role ambiguity and role performance were achieved with the beliefs of the ability (role efficacy). The findings supported the multidimensional of role as productive machinery and through that machinery role ambiguity could affect all role performance. In other words, the lack of clearness regarding role responsibilities could be expressed as oppressive thoughts for effective performance, which in their turn affect the performance itself.

Later, the research of Eys, Carron, Beauchamp and Bray (2003), attempted to examine the nature of role ambiguity in sport teams, as well as the validity of the functional definition of role ambiguity that was formed by Beauchamp and his colleagues (2002). In this case too, role ambiguity was operationalized as a multidimensional construct (Scope of Responsibilities, Behavioral Responsibilities, Evaluation of Performance and Consequences of Not Fulfilling Responsibilities) that occurs in two contexts, offense and defense. Consistent with the hypothesis, perceptions of role ambiguity exhibited some degree of within – group consistency and group – level variability, but most of the variance in role ambiguity was seen at the individual level. Also, perceptions of role ambiguity decreased from early to late season. Veteran athletes experienced less role ambiguity than first - year athletes at the

beginning of the season, but not at the end. It is likely that by the end of the season the rookies would have time to obtain the requisite information as to what is expected of them.

On 2005 Beauchamp, Bray, Fielding, and Eys, examined again the relation between role ambiguity and role efficacy on sport teams. Role Ambiguity explained that the 20% of the total variance of role efficacy (offense – defense) for the individual differences but also for the team differences.

There is also some research that tried to connect role ambiguity with other factors like anxiety and satisfaction. Beauchamp, Bray, Eys and Carron (2003) according to the theory of multidimensional anxiety, Martens, Vealey and Burton (1990) have tried to examine the relation between role ambiguity and the anxiety on hockey, and presumed that role ambiguity would be positively related to cognitive but not to somatic A- state. However, contrary to hypotheses, ambiguity predicted both cognitive and somatic A- state.

Eys, Carron, Bray and Beauchamp (2003) examined the relation between the perceptions of the athletes about role ambiguity and satisfaction. The relation between those multidimensional structures was studied in the beginning and in the end of sports period. They revealed that the lowest perception of role ambiguity was connected with the greatest satisfaction of the athlete. In particular, role ambiguity as it is represented from the dimension (Scope of responsibilities) during offense was more connected to the satisfaction of the athlete of leadership from the beginning and in the end of it.

The purpose of this research was to investigate the use of the questionnaire of Role Ambiguity, Beauchamp, Bray, Eys and Carron (2002) in offensive and defensive responsibilities, of Greek Team Sports' athletes, (basketball, volleyball, handball and football), by checking its structural validity and reliability.

2. METHOD AND PROCEDURE

2.1. Sample

The sample consisted of 409 athletes: 14 team sports from basketball (n=125), 8 team sports from volleyball (n=75), 12 team sports from handball (n=103) and 9 teams sports from football (n=106). The athletes' mean age was 21,39 years SD = 4,61. Athletes had an average of 8,8 years' (SD = 4,5) playing experiences.

2.2. Questionnaire

The instrument that was used was the role ambiguity questionnaire "Role Ambiguity Scale" Beauchamp, Bray, Eys, and Carron (2002) and referred to the tasks

of offense and defense. The translation of the questionnaire into the Greek language was made by Bebetos, Theodorakis, and Tsigilis (under submission).

The questionnaires used 20 questions (offense and defense) that were designed to evaluate the grade of ambiguity and the lack of ambiguity that is related to: a) the scope of responsibilities, 5 questions for example 'I understand the extent of my responsibilities', b) behavior that is necessary to achieve these responsibilities 5 questions for example 'I know what behaviors are necessary to carry out my responsibilities', c) how the performance which is related to these responsibilities is evaluated 5 questions for example 'I understand how my role is evaluated' and d) the consequences of a failure to successfully achieve those responsibilities, 5 questions, for example 'I know what will happen if I don't perform my role responsibilities'.

The questionnaire was given during the middle of sports period of 2005-2006 before the athletes' practice and they were asked to complete it voluntarily.

3. RESULTS

The results of internal consistency showed the satisfactory levels Cronbach's alpha (from .76 - .86) and are presented in Table 1.

TABLE 1: CRONBACH'S ALPHA

ITEMS	CRONBACH'S ALPHA
Scope of responsibilities in offense	.81
Role behaviors in offense	.78
Role evaluation in offense	.83
Role consequences in offense	.76
Scope of responsibilities in defense	.85
Role behaviors in defense	.84
Role evaluation in defense	.86
Role consequences in defense	.77

Some positive connection was presented between the four factors both in offense and defense on the level of importance $p < .01$ and the results are presented in Table 2.

TABLE 2: CORRELATION OF ITEMS ($p < .01$)

	1	2	3	4	5	6	7	8
Scope of responsibilities in offense								
Role behaviors in offense								
Role evaluation in offense								
Role consequences in offense								
Scope of responsibilities in defense								
Role behaviors in defense								
Role evaluation in defense								
Role consequences in defense								

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Role evaluation in offense	,635	,641					
Role consequences in offense	,605	,572	,592				
Scope of responsibilities in defense	,645	,646	,554	,634			
Role behaviors in defense	,631	,662	,594	,628	,829		
Role evaluation in defense	,540	,567	,636	,499	,707	,768	
Role consequences in Defense	,515	,468	,467	,740	,698	,685	,578

Exploratory factor analysis was made in the answers of the athletes (men and women) for the questionnaire that referred to role ambiguity on offense. The results revealed four factors from eigen value 1 that explained the 63% of the total variation. An axis rotation followed both sidelong and orthogonal because the factors weren't connected, some results are mentioned from the orthogonal rotation.

At the first factor 'Ambiguity related to Scope of Responsibilities' regarding offense that explained the 21% of the total variation with loadings over .51, to the second factor 'Role Behavior Ambiguity' regarding offense that explained the 16% of the total variation with loadings over .40, to the third factor 'Role Evaluation Ambiguity' regarding offense that explained the 14% of the total variation with loadings over .65, and to the fourth factor 'Role Consequences Ambiguity' that explained the 12% of the total variation with loadings over .69. More details for the questionnaire factor loadings in Table 3.

TABLE 3: FACTOR LOADINGS OF ITEMS (OFFENSE)

ITEMS	SCOPE OF RES.	ROLE BEHAVIOR	ROLE EVALUAT.	ROLE CONS.
I understand the extent of my offensive responsibilities.	.68			
I understand the scope of my offensive responsibilities.	.66			
I understand all of my offensive responsibilities.	.71			
I am unclear about the breadth of my offensive responsibilities.	.70			
I am clear about the different responsibilities that make up my offensive role.	.51			
I understand what adjustments to my behavior need to be made to carry out		.40		

my offensive role.	
I understand the behaviors I must perform to carry out my offensive role.	.58
I know what behaviors are necessary to carry out my offensive responsibilities.	.74
It is clear what behaviors I should perform to fulfill my offensive role	.73
I am unclear what behaviors are expected of me in order to carry out my offensive role.	.70
I understand the criteria by which my offensive role responsibilities are evaluated.	.76
I understand how my offensive role is evaluated.	.77
It is clear to me how my offensive role responsibilities are evaluated.	.75
I am unclear about the way in which my offensive role responses are evaluated.	.73
The criteria by which my offensive role is evaluated are clear to me.	.65
It is clear to me what happens if I fail to carry of my offensive role responsibilities.	.70
I understand the consequences of failing to carry out my offensive role responsibilities.	.69
I am unclear about the consequences of failing to carry out my offensive role responsibilities.	.73
I understand the consequences of unsuccessful offensive role performance.	.74
I know what will happen if I don't perform my offensive role responsibilities.	.70

Exploratory factor analysis has been made to the questionnaire that concerned role ambiguity regarding the answers of the athletes (men & women) on defense. The results have revealed four factors over 1 that explained the 70% of the total variation. Also an axis rotation orthogonal was performed.

At the first factor 'Ambiguity related to Scope of Responsibilities' regarding attack that explained the 50% of the total variation with factor loadings over .53, to the second factor 'Role Behavior Ambiguity' regarding defense that explained the 8% of

the total variation with loadings over .74, to the third factor 'Role Evaluation Ambiguity' regarding defense that explained the 7% of the total variation with loadings over .79, and to the fourth factor 'Role Consequences Ambiguity' that explained the 5% of the total variation with loadings over .77. More details for the questionnaire loadings in Table 4. To examine the factorial structure of the questionnaire the confirmatory factor analysis which was done with the statistic pack EQS 5.7 was used (Bentler, 1995).

TABLE 4: FACTOR LOADINGS OF ITEMS (DEFENSE)

ITEMS	SCOPE OF RES.	ROLE BEHAVIOR	ROLE EVALUATION	ROLE CONS.
I understand the extent of my defensive responsibilities.	.84			
I understand the scope of my defensive responsibilities.	.82			
I understand all my defensive responsibilities.	.83			
I am unclear about the breadth of my defensive responsibilities.	.53			
I am clear about the different responsibilities that make up my defensive role.	.84			
I understand what adjustments to my behavior need to be made to carry out my defensive role.		.74		
I understand the behavior I must perform to carry out my defensive role.		.77		
I know what behaviors are necessary to carry out my defensive responsibilities.		.81		
It is clear about what behavior I should perform to fulfill my defensive role.		.77		
I am unclear about what behavior is expected of me in order to carry out my defensive role.		.81		
I understand the criteria by which my defensive role responsibilities are evaluated.			.84	
I understand how my defensive role is evaluated.			.86	
It is clear to me how my defensive role responsibilities			.88	

are evaluated.	
I am unclear about the way in which my defensive role responses are evaluated.	.79
The criteria by which my defensive role is evaluated are clear to me.	.82
It is clear to me what happens if I fail to carry out my defensive role responsibilities.	.80
I understand the consequences of failing to carry out my defensive role responsibilities.	.81
I am unclear about the consequences of failing to carry out my defensive role responsibilities.	.77
I understand the consequences of unsuccessful defensive role performance.	.89
I know what will happen if I don't perform my defensive role responsibilities.	.86

For the level *Role Ambiguity in offense* that examined a model of four factors first class with equivalent questions. The factor variation was defined in 1 and the factorial loadings were free to be estimated. At this model the variations between the factors were allowed but not between the mistakes of the items. The results showed that the specific model represented efficiently the variations between the variables. The index of this model were $\chi^2 (164) = 662.114$ $p < .001$, Bentler – Bonett normed fit index (NFI) = 0.845, Bentler – Bonett non normed fit index (NNFI) = 0.859, Comparative fix index (CFI) = 0.878, RMSEA = 0.086 and 90% confidence interval of RMSEA= (0.079-0.093). The descriptive statistics of every sub scale are presented in Table 5 and the rates of every factor in Table 6, as well as the MARDIA'S COEFFICIENT = 276.220.

TABLE 5: DESCRIPTIVE STATISTICS FOR ITEMS

ITEMS	MEAN	SDV	SKEWNESS G1	KURTOSIS G2
I understand the extent of my offensive responsibilities.	7.66	1.122	-0.68	0.39
I understand the scope of my offensive responsibilities.	7.69	1.150	-0.71	0.18
I understand all of my offensive responsibilities.	7.42	1.222	-0.55	-0.03

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I am unclear about the breadth of my offensive responsibilities.	7.16	1.733	-0.97	0.32
I am clear about the different responsibilities that make up my offensive role.	7.22	1.392	-1.00	1.73
I understand what adjustments to my behavior need to be made to carry out my offensive role.	7.50	1.276	-1.31	3.02
I understand the behaviors I must perform to carry out my offensive role.	7.45	1.228	-1.02	1.74
I know what behaviors are necessary to carry out my offensive responsibilities.	7.47	1.186	-1.05	2.50
It is clear what behaviors I should perform to fulfill my offensive role.	7.44	1.351	-1.31	3.24
I am unclear what behaviors are expected of me in order to carry out my offensive role.	7.32	1.682	-1.23	1.17
I understand the criteria by which my offensive role responsibilities are evaluated.	6.99	1.450	-1.12	1.85
I understand how my offensive role is evaluated.	7.13	1.447	-1.07	1.58
It is clear to me how my offensive role responsibilities are evaluated.	7.25	1.374	-0.97	1.33
I am unclear about the way in which my offensive role responses are evaluated.	6.44	2.028	-0.67	-0.34
The criteria by which my offensive role is evaluated are clear to me.	7.16	1.302	-0.93	1.35
It is clear to me what happens if I fail to carry out my offensive role responsibilities.	7.26	1.534	-1.37	2.70
I understand the consequences of failing to carry out my offensive role responsibilities.	7.62	1.326	-1.43	3.45
I am unclear about the consequences of failing to carry out my offensive role.	6.74	2.053	-0.80	-0.30
Responsibilities.				
I understand the consequences of unsuccessful offensive role performance.	7.60	1.339	-1.63	4.19
I know what will happen if I don't perform my offensive role responsibilities.	7.40	1.506	-1.59	3.41

TABLE 6: FACTOR LOADINGS

ITEMS	LOADING	ERROR	R SQUARED (%)
I understand the extent of my offensive responsibilities.	0.836	0.548	0.699
I understand the scope of my offensive responsibilities.	0.735	0.678	0.540
I understand all of my offensive responsibilities.	0.831	0.557	0.690
I am unclear about the breadth of my offensive responsibilities.	0.558	0.830	0.312
I am clear about the different responsibilities that make up my offensive role.	0.618	0.786	0.382
I understand what adjustments to my behavior need to be made to carry out my offensive role.	0.545	0.838	0.297
I understand the behaviors I must perform to carry out my offensive role.	0.737	0.676	0.544
I know what behaviors are necessary to carry out my offensive responsibilities.	0.746	0.666	0.557
It is clear what behaviors I should perform to fulfill my offensive role.	0.724	0.689	0.525
I am unclear what behaviors are expected of me in order to carry out my offensive role.	0.586	0.810	0.344
I understand the criteria by which my offensive role responsibilities are evaluated.	0.767	0.641	0.589
I understand how my offensive role is evaluated.	0.809	0.588	0.654
It is clear to me how my offensive role responsibilities are evaluated.	0.831	0.556	0.691
I am unclear about the way in which my offensive role responses are evaluated.	0.467	0.884	0.218
The criteria by which my offensive role is evaluated are clear to me.	0.794	0.608	0.631
It is clear to me what happens if I fail to carry out my offensive role responsibilities.	0.607	0.795	0.368
I understand the consequences of failing to carry out my offensive role responsibilities.	0.707	0.707	0.500
I am unclear about the consequences of failing to carry out	0.499	0.866	0.249

my offensive role responsibilities. I understand the consequences of unsuccessful offensive role performance.	0.803	0.596	0.645
I know what will happen if I don't perform my offensive role responsibilities.	0.647	0.763	0.418

For the level *Role Ambiguity in defense* that examined a model of four factors first class with equivalent questions. The factor variation was defined in 1 and the factorial loadings were free to be estimated. At this model the variations between the factors were allowed but not between the mistakes of the items. The results showed that the specific model represented efficiently the variations between the variables. The index of this model were $\chi^2 (164) = 689.163$ $p < .001$, Bentler – Bonett normed fit index (NFI) = 0.876, Bentler – Bonett non normed fit index (NNFI) = 0.887, Comparative fit index (CFI) = 0.903, RMSEA = 0.089 and 90% confidence interval of RMSEA = (0.082-0.095). The descriptive statistics of every sub scale are presented in Table 7 and the rates of every factor in Table 8, as well as the MARDIA'S COEFFICIENT = 361.153. All fit assessments are presented in Table 9.

TABLE 7: DESCRIPTIVE STATISTICS FOR ITEMS

ITEMS	MEAN	SDV	SKEWNESS G1	KURTOSIS G2
I understand the extent of my defensive responsibilities.	7.88	1.111	-1.03	1.00
I understand the scope of my defensive responsibilities.	7.81	1.119	-1.02	1.23
I understand all of my defensive responsibilities.	7.72	1.151	-0.83	0.39
I am unclear about the breadth of my defensive responsibilities.	7.19	1.894	-1.14	0.59
I am clear about the different responsibilities that make up my defensive role.	7.48	1.277	-1.04	1.45
I understand what adjustments to my behavior need to be made to carry out my defensive role.	7.66	1.181	-1.04	1.77
I understand the behaviors I must perform to carry out my defensive role.	7.58	1.259	-1.16	2.17

I know what behaviors are necessary to carry out my defensive responsibilities.	7.67	1.164	-0.75	0.25
It is clear what behaviors I should perform to fulfill my defensive role.	7.50	1.240	-1.07	2.59
I am unclear about what behaviors are expected of me in order to carry out my defensive role.	7.17	1.791	-1.21	0.98
I understand the criteria by which my defensive role responsibilities are evaluated.	7.37	1.429	-1.16	1.96
I understand how my defensive role is evaluated.	7.37	1.366	-0.96	1.16
It is clear to me how my defensive role responsibilities are evaluated.	7.36	1.481	-1.18	1.84
I am unclear about the way in which my defensive role responses are evaluated.	6.82	2.040	-0.90	-0.16
The criteria by which my defensive role is evaluated are clear to me.	7.34	1.383	-0.97	1.04
It is clear to me what happens if I fail to carry out my defensive role responsibilities.	7.54	1.362	-1.35	2.74
I understand the consequences of failing to carry out my defensive role responsibilities.	7.74	1.199	-1.51	4.79
I am unclear about the consequences of failing to carry out my defensive role responsibilities.	6.69	2.228	-0.89	-0.28
I understand the consequences of unsuccessful defensive role performance.	7.78	1.194	-1.72	5.56
I know what will happen if I don't perform my defensive role responsibilities.	7.57	1.478	-1.61	3.43

TABLE 8: FACTOR LOADINGS

ITEMS	LOADING	ERROR	R SQUARED (%)
I understand the extent of my defensive responsibilities.	0.796	0.605	0.634
I understand the scope of my defensive responsibilities.	0.826	0.563	0.683
I understand all of my defensive responsibilities.	0.828	0.561	0.686
I am unclear about the breadth of my defensive responsibilities.	0.591	0.806	0.350
I am clear about the different responsibilities that make up my defensive role.	0.790	0.614	0.624
I understand what adjustments to my behavior need to be made to carry out my defensive role.	0.737	0.676	0.543
I understand the behavior I must perform to carry out my defensive role.	0.806	0.592	0.650
I know what behavior is necessary in order to carry out my defensive responsibilities.	0.808	0.589	0.653
It is clear what behavior I should perform to fulfill my defensive role.	0.792	0.611	0.627
I am unclear what behavior is expected of me in order to carry out my defensive role.	0.593	0.805	0.352
I understand the criteria by which my defensive role responsibilities are evaluated.	0.819	0.573	0.671
I understand how my defensive role is evaluated.	0.830	0.558	0.688
It is clear to me how my defensive role responsibilities are evaluated.	0.838	0.546	0.702
I am unclear about the way in which my defensive role responses are evaluated	0.565	0.825	0.319
The criteria by which my defensive role is evaluated are clear to me.	0.803	0.596	0.645
It is clear to me what happens if I fail to carry out my defensive role responsibilities.	0.729	0.685	0.531
I understand the consequences of failing to carry out my defensive role responsibilities.	0.770	0.638	0.593
I am unclear about the consequences of failing to carry out my defensive role responsibilities.	0.382	0.924	0.146

I understand the consequences of unsuccessful defensive role performance.	0.875	0.485	0.765
I know what will happen if I don't perform my defensive role responsibilities.	0.779	0.627	0.607

TABLE 9: FIT ASSESSMENTS

	R.A. OFFENSE	R.A. DEFENSE
X ² /(df)	662.114 (164)*	689.163 (164)*
NFI	0.845	0.876
NNFI	0.859	0.887
CFI	0.878	0.903
IFI	0.879	0.903
GFI	0.850	0.846
AGFI	0.808	0.803
RMR	0.067	0.230
RMSEA	0.086	0.089

* p<.001

4. CONCLUSION

Although the association between role ambiguity and performance has been proposed by theory and supported by empirical research, little effort has been made to account for theorized mediators through which ambiguity may affect performance. Jackson and Schuler (1985) indicated that role ambiguity seems to have motivational implications for the individual role occupant. Lack of clarity regarding role responsibilities may be further manifested in beleaguered thoughts about capabilities to perform effectively, which in turn affect performance.

The results of the use of the questionnaire of Role Ambiguity, Beauchamp, Bray, Eys and Carron (2002), in offensive and defensive responsibilities, of Greek Team Sports' athletes, (basketball, volleyball, handball and football) are presented in this research, by checking the questionnaires structural validity and reliability. It is one of the first adaptations of the questionnaire above to the Greek facts.

All the sub scales of this questionnaire either regarding defense or offense presented satisfactory levels of confidence internal. Similar results found in the research of Beauchamp, Bray, Fielding and Eys (2005) and the Beauchamp and Bray (2001) where we also had satisfactory levels of confidence internal (from .80 to .84).

The four factors of role ambiguity regarding offense when correlated with other and when correlated with the four factors of role ambiguity regarding defense presented high positive correlation. When role ambiguity existed in offense, it also existed in defense. Similar results of positive correlation were also found in the research of Eys, Carron, Beauchamp and Bray (2003).

Regarding the structure of the scale, it was presented as multi factorial and agreed with the factorial structure of the prototype of Beauchamp, Bray, Eys, and Carron (2002). The factorial analysis and the confirmative factorial analysis ensured the existence of the four factors in the questionnaire above having also a high percentage of variation, while the rates of the factors were found satisfactory.

Checking role ambiguity could be extended in the future to all team sports, and differences within them such as gender, athletes used as starting and those used as no starting, during a game period (either in the beginning, in the middle or the end of that period). Future research should look to replicate the current study to examine differences similar to those found here between veteran and first - year players in samples of different sport type and competition level. It could also be related with other factors such as the model of coaching performance (autarchic or democratic, positive or negative supply) or with the athletes' satisfaction.

In conclusion, the present study has provided additional evidence for the validity of the multidimensional conceptualization of role ambiguity in a sport setting. Results highlight the importance of using a multidimensional approach to investigate role ambiguity in sport and are discussed in terms of both theory advancement and possible interventions. Also, continued validation should be conducted to confirm the factor structure of the role ambiguity questionnaire used in the present study.

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PERFORMANCE OF BUSINESS STUDENTS IN EXAMINATIONS: CROSS-CORRELATION ANALYSIS BETWEEN EXAMINATION RATES AND LECTURE ATTENDANCE

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ABSTRACT

This work presents the findings of a research that was conducted in relation with lectures attendance and business students' performance during the examinations of their faculties. The research was conducted at T. E. I. of Serres and T.E.I. of Thessaloniki, Katerini branch, where 474 valid questionnaires were gathered. Statistical analysis was realised with the utilisation of multiple linear regression to discover factors that reflect the success of students in the examinations of their schools. The results are discussed and directions for further research are given.

Keywords: Students Performance; Attendance of Lectures; Higher Education; Regression.

1. INTRODUCTION

Education as a basic social operation constitutes important component of culture and civilization, while at the same time it influences the economic activity and contributes to individuals' social and personal progress. As Kamenidou (2004) observed, after 1996, the Greek higher education showed a significant increase in the numbers of the department as well as students. Plethora and importance of future potential scientific human resources of any country constitute an important stake on behalf of the educational system with regard to its management. A basic characteristic of a successful educational system is students' performance during their studies. Stanca (2004) said that it is widely acceptable that the performance of students in higher education is straight proportional to the lecture attendances. Nevertheless, this admission needs to be examined, because developments in technology require more and more re-evaluation of the traditional approach in higher education. On the other hand, higher parameterization with important different factors ensures the output of reliable conclusions.

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The basic aim of this research is the investigation of students' performance during their examinations in their faculties with lecture attendances in the framework of their educational process. Additional objectives are the investigation 1) of factors that affect the configuration of students' performance, and 2) the degree of influence of lecture attendance as well as the impact of other factors on the individual performance of students.

This research leads us to draw useful conclusions that will help the Greek public higher educational Institutions to optimise their performance through their students' better individual performance. The rest of this paper is organized as follows: The next section provides a review of the relevant literature. The third section discusses the research methodology. The fourth section presents the research findings. Finally, the paper concludes with a summary of the findings and considers the study's limitations and is also acts as a motive for further research.

2. LITERATURE REVIEW

Past research studies have been carried out aiming at the investigation of the degree of dependence of students' performance with the number of lecture attendances. McConell and Lamphear (1969); Paden and Moyer (1969); Buckles and McMahon (1971); Siegfried and Fels (1979); Browne, et al. (1991), supported that the findings of these studies showed an insignificant relation between students' performance with the number of lecture attendances. However, during the 1990's an important number of studies, Romer (1993); Durden and Ellis (1995); Devadoss and Foltz (1996); Marburger (2001); Dolton et al (2003); Kirby and McElroy (2003), showed a relatively positive relation between lecture attendance and students' grades.

More specifically in a widely used study, Romer (1993), examining absenteeism elements in a sample of 195 undergraduate students of macroeconomics in three American Universities, found out a medium rate of attendance in lectures in about 67%. In this study the results of the regression analysis have shown a positive and important relation between the attendance of students and their performance in the examinations.

Schmidt (1983), researching a sample of 216 students of macroeconomics, found out that the time spent in lectures and discussions had a positive and an important effect on students' performance during their examinations in relation to their hours of study. According to the findings the attendance of lectures was the most important activity of the students who were staying in University Campus, followed by the attendance of laboratories and finally the discussions about of their studies with their professors outside the classroom.

Park and Kerr (1990) in their research in finance students in a four year period found a slight relation between the attendance of students and their performance, even after analyzing their absenteeism reasons. Nevertheless, connecting the students'

grades (A, B, C, D, and F) with the number of presences of each student, they realised that the frequent attendance helps students to avoid D and F grades. They showed that the most influential factor was the study at home (good preparation).

Durden and Ellis (1995) searched the relation of performance-attendance in a sample of 346 sophomore students of economics. The findings interpreting explanatory and motivational factors have showed the positive relation of performance-attendance. More specifically, while a relatively small number of absences have a little impact on the performance, excessive and systematic absenteeism from the lectures has a wide and important effect.

Devados and Foltz (1996) examined the attendance in lectures in a sample of 400 students of rural economy in 4 well-known American Universities. They concluded that the students who were present in almost all the lectures had a better grade average than the students who had less than 50% of lecture attendance. More recently, Marburger (2001) searched the relation of absences from the lectures and their performance during the examinations. The sample was composed of 60 students of principles of microeconomics class. The results of this research showed that the students who did not attend a lecture had more possibilities of answering wrong in a lecture question in comparison with those who attended the lectures.

Kirby and Mc Elroy (2003), examining the relation of attendance and performance in a sample of 368 freshmen in economics found a marginally positive relation between them. Also, it was found that the hours of study at home (good preparation) and the hours spent for lecture attendance were the basic factors of performance. Dolton et al. (2003) carrying out a research in a big sample of Spanish students found that the attendance of lectures and studying at home have a positive effect on performance with the first being even 4 times more powerful than the second. Terenzini et al. (1984) reported that the attendance of lectures acts beneficially in the academic performance. These results are consistent with previous studies (Buckalew et al, 1986; Simpson and Nist, 1992). The reasons of students' absenteeism are mainly coincidence of hour of attendance with other lectures, boring teaching, sickness or other social obligations as Van Blerkom (1992) supported.

In the framework of factorization of the regression model that was developed in the present study and serving the individual objectives of research, the bibliography led us to discover more suitable parameters that also influence the performance of students in the examinations of their faculties. Wang et al., (1993) in their research showed 28 factors that influence students' performance and which are separated in 6 general categories. Distinguishing the factors that affect the students in classroom we distinguished the total presence during the lectures, the quality of teaching, books, visual aids, the attendance of lectures, the attendance of laboratories, the study at home, the teaching method and the quality of attendance on behalf of the students. This last parameter usually includes the element of minimum attendance in the sense that a standard number of hours are required by the University itself to be entitled to

take part in the examinations. Similar findings reported in a research that was carried out in the Glasgow Caledonian University by Stevenson et al (1997), as well as in Khanna (1993) bibliographical review. Keegan (1990) determines the 5 main elements of success of students in the examinations: the use of technical tools (visual aids), the printed material, the dialogue and the communication between professors and students (good professors) as well as the possibility of lectures' attendance. Burge and Howard (1990) in a similar research concluded that the quality of professors and the good teaching material (books, visual aids), were the basic factors of good performance. In the research of Oscar et al. (2005), in the University of Pennsylvania the more basic factors of success of the system were the quality of the faculty and personnel, printed material and the bibliography as well as the progressive cognitive growth of students.

3. METHODOLOGY

The research was carried out during the examination periods of June and September 2005, at TEI of Serres and TEI of Thessaloniki (Katerini branch). 474 self aided administrated valid questionnaires were collected, which were according to Hair et al., (1995) considered satisfactory for the objectives and statistical analyses of this research. The sampling method of mall intercept personal interview, in combination with sampling with criteria were employed as had been proposed by Aaker et al., (1998) and Malhotra (1996) and Hair et al, (2003). The sample composed of students who actually were active students of TEI of Serres and TEI of Thessaloniki, (Katerini branch) and they had already completed at least one semester of their studies.

3.1. Questionnaire

A two-page questionnaire had been formed as the research instrument for this work based on literature review and the objectives of the study. This questionnaire was divided into three thematic parts. Section 1 was devoted to basic demographic information (age, gender, semester of studies, etc). Section 2 of the questionnaire included 3 questions. Based on these questions the dependent variable, numerical type (grade) was created, which represented the student's performance in the examinations in the model of multiple linear regression (Dafermos, 2005). The first independent variable (predictor variable) that was used for the forecast of the dependent variable in the regression was the numerical type variable (number of attendances) which represents, according to students' statement the total number of the lectures of a module normally attended by the student during the semester. Section 3 included 8 variables the choice of which was based on the literature review and the measuring was implemented using ordinal scales, and a 5 point Likert type scale with scores

from 1 “absolutely negative” to 5 “absolutely positive” as Churchill and Brown (2004) propose. Howell (1997), and also Dancey and Reidy (1999), support that such an escalation, that is to say such a transformation of categories in numbers, gives the social scientists the possibility to carry out any analysis they wish. The 8 variables that were used in the model were:

1. Attendance of lectures = the independent variable that it involves the contribution of the attendance of the theoretical part of the course.
2. Attendance of laboratories = it reflects the contribution of the attendance of laboratories.
3. Good professors = the quality of professors (communicability, effectiveness, knowledge of the object).
4. Good books = printed material (books, notes, bibliography).
5. Good preparation = study at home.
6. Good attendance = careful attending of taught courses.
7. Teaching methods = the applied methods of teaching in both theoretical and laboratorial parts of the course.
8. Teaching aids = the audiovisual material that is used for better comprehension of the lecture.

3.2. Data analysis

SPSS ver. 12.0 was used for analyzing the data in this study. The method of Multiple Linear Regression was conducted and it included:

1. The choice of cases based on List Wise Method.
2. The ascertainment of simple linear cross-correlations.
3. The input-output of variables from the model.
4. The synopsis of indicators of regression model.
5. The interpretation of regression equation and the value of used variables.
6. The control of admissions.

4. FINDINGS

4.1. Demographic profile of students.

The sample comprised students from the departments of Business Administration and Economics of TEI of Serres and TEI of Thessaloniki (Katerini branch of logistics). The majority of students (74%) were in the 20-22 years age category. Freshmen were the 19%, sophomores were the 28%, juniors the 21%, and senior students the rest 32%. Regarding gender, 65% of the participants were women and

35% men. Finally, 81% of students graduated from General Lyceums and 19% from Technical Professional Lyceums.

4.2. Analysis of results – discussion.

The analysis was carried out with the utilisation of multiple linear regression. The dependent variable (grade) is numerical type and reveals the score of each student in the examinations. This calculation is the product of treatment of three questions in the questionnaire. The method of choice of independent variables was selected to be stepwise. The sample was taken from 474 cases, which is considered satisfactory for the needs of the research. Coakes and Steed (1999), consider that the number of cases should be at least five times the number of variables (predictors). Also, Field (2000), supports that for one reliable regression model we need 15 observations (cases) per independent variable.

TABLE 1: DESCRIPTIVE STATISTICS

	Mean	Standard Deviation	N
Grade	6,07640	1,891869	456
number of attendances	8,02	2,600	456
attendance of lectures	3,05	0,981	456
attendance of laboratories	3,19	1,005	456
good professors	2,99	1,029	456
good books	2,97	0,976	456
good preparation	2,93	1,010	456
good attendance	2,99	0,958	456
teaching methods	3,24	1,084	456
teaching aids	3,11	1,031	456

From Table 1 (Descriptive Statistics), it can be observed that from 474 cases, 456 were finally selected for the regression as a result of missing values via the Listwise Method (Norusis, 2002). It can also be observed that the mean of the sample is 6,07640 which represents the average grade of students that participate in the sample and that the standard deviation of the sample of 456 cases is 1,891869 which is a measurement that shows the fluctuation or the gathering of distribution's grade from the mean, which in this specific case is considered to be satisfactory.

TABLE 2: CORRELATIONS

Pearson Correlation	Grade	1,000
	number of attendances	0,920
	attendance of lectures	0,853
	good books	0,703
	good preparation	0,691
	good attendance	0,725
	teaching methods	0.893
	teaching aids	0.874
Sig. (1-tailed)	Grade	.
	number of attendances	0,000
	attendance of lectures	0,000
	attendance of laboratories	0,000
	good professors	0,000
	good books	0,000
	good preparation	0,000
	good attendance	0,000
	teaching methods	0,000
	teaching aids	0,000

Table 2 reveals that each one of the independent variables has high cross-correlation with the dependent one, with Pearson indicator presenting higher price (0,92) in predictor “number of attendance”(number of student’s attendance) and lower price (0,691) in the variable “good preparation” (study preparation at home). In the area that shows the level of statistical importance Sig. (1- tailed) we observe the high linear relation of all independent variables with the dependent one Sig. (1-tailed) = $0,0005 < 0,05$.

Running the regression process, with the use of Stepwise method, SPSS inserts and removes from the model with criteria: Stepwise (Criteria: Probability-of - F-to-enter $\leq 0,050$, Probability-of - F- to -remove $\geq 0,100$).

In order of model insertion we have: a) number of attendance, b) teaching methods, c) attendance of lectures, d) good attendance, e) attendance of laboratories, f) good professors. From the total number of 9 variables, three were finally removed: a) teaching aids, which in spite of the high intensity of linear relation with the dependent variable $r = 0,874$, it was finally removed because of the high cross-correlation that it had with other predictors b) good books and c) good preparation were also removed for the same reasons.

TABLE 3: MODEL SUMMARY (G)

Model	R	R Square	Adjusted R Square	R Square Change	Sig. F. Change	Durbin-Watson
1	0,920(a)	0,846	0,845	0,846	0,000	
2	0,936(b)	0,876	0,875	0,030	0,000	
3	0,941(c)	0,885	0,884	0,009	0,000	
4	0,943(d)	0,890	0,889	0,005	0,000	
5	0,944(e)	0,891	0,890	0,001	0,016	
6	0,945(f)	0,893	0,891	0,001	0,019	1,700

- a. Predictors: (Constant), number of attendances.
- b. Predictors: (Constant), number of attendances, teaching methods.
- c. Predictors: (Constant), number of attendances, teaching methods, attendance of lectures.
- d. Predictors: (Constant), number of attendances, teaching methods, attendance of lectures, good attendance.
- e. Predictors: (Constant), number of attendances, teaching methods, attendance of lectures, good attendance, attendance of laboratories.
- f. Predictors: (Constant), number of attendances, teaching methods, attendance of lectures, good attendance, attendance of laboratories, good professors.
- g. Dependent Variable: Grade.

Table 3 presents a synopsis of regression model indicators, using the Stepwise method, which appears to be developed in 6 phases, that is to say, the same number as the independent variables that were inserted. In column 3 that shows the multiple determination factor R Square (Goodness of fit), we observe that after the insertion of 6 predictors (model 6), the 89,3% of total dissemination of the dependent variable “grade” is explained, which is considered high for Social Sciences (Myers, 1990).

Factor R of multiple cross-correlation (column 2), with rate 94,5%, shows high cross-correlation between observed and forecasted prices of the dependent variable. The adapted determination factor in column 4 (adjusted R Square), has high provident price (89,1%). In addition, this fact is also confirmed by ratio $n/k = 474:9=52,66 > 5$ (n = cases, k = variables). In column 5, with indicator R Square Change, we observe that in model 1, where only “number of attendance” was the inserted variable, the grade was 84,6%. The insertion of the second predictor “teaching methods”, offered 3% more, while it proportionally offered the other remained variables.

Finally in column 6 which shows the levels of statistical importance Sig. F Change, reveals that the last predictor was inserted with Sig. F Change = 0,019 < 0,05.

TABLE 4: COEFFICIENTS (A)

Model		Unstadardized Coefficients		t	Collinearity Statistics	
		B	St. Error		Tolerance	VIF
6	(Constant)	0,142	0,108	1,319		
	number of attendances	0,319	0,028	11,542	0,166	6,042
	teaching method	0,358	0,083	4,334	0,107	9,369
	attendance of lectures	0,245	0,063	3,896	0,224	4,457
	good attendance	0,165	0,046	3,607	0,444	2,255
	attendance of laboratories	0,207	0,081	2,551	0,129	7,762
	good professors	0,105	0,044	2,360	0,409	2,447

a Dependent Variable: Grade

Column B contains all the information for the 7 variables of retrograde equation included also the constant term. Thus, the retrograde equation that was formed using data of sample is the following: Grade = 0,319 number of attendance + 0,358 teaching methods + 0,245 attendance of lectures + 0,165 good attendance + 0,207 attendance of laboratories + 0,105 good professors + 0,142.

All factors that are multiplied with variables are positive. Consequently, all the forecasting variables that were included in the equation have positive effect in the dependent variable “grade”. The higher influence is exerted by variable “teaching methods”, as the factor which is multiplied with, is at absolute price the biggest (0,358). However, the best predictor variable is “number of attendance”, because the column with “t” prices shows a grade of 11,542 which is the biggest absolute price.

TABLE 5: COLLINEARITY DIAGNOSIS (A)

Mod.	Dim.	Eigen value	Condition Index	Variance Proportions						
				Constant	Number of attendances	Teaching method	Attendance of lectures	Good attendance	Attendance of laboratories	Good professors
6	1	6,813	1,000	0,00	0,00	0,00	0,00	0,00	0,00	0,00
	2	0,070	9,873	0,83	0,01	0,01	0,01	0,00	0,01	0,00
	3	0,046	12,233	0,08	0,01	0,03	0,00	0,08	0,04	0,55
	4	0,035	14,030	0,06	0,00	0,00	0,01	0,91	0,00	0,23
	5	0,018	19,287	0,00	0,01	0,04	0,82	0,00	0,08	0,20
	6	0,013	23,314	0,00	0,94	0,03	0,16	0,00	0,11	0,02
	7	0,007	29,160	0,03	0,03	0,89	0,00	0,00	0,78	0,00

a Depended Variable: Grade

Control of admissions:

- a. Independence control admission is satisfied via Durbin-Watson statistical indicator (table 3). Since this indicator has score between 1,5-2,5 (1,70) the observation independence is ensured. Apart from this, the number of observations (474) is multiplex from predictor's number.
- b. In Table 4, where Tolerance Factor is analysed, we observe the absence of prices nearby zero (0), while (in the same table), the Variance Inflation Factor-VIF, does not receive, in any case, prices superior to ten (10), which means lack of multi-linear evasion. In multi- linear evasion control (Colinearity Diagnosis, Table 5) and in column of eigenvalues of covariance matrix, we observe that not even one of the variables has grade near zero (0), which also means lack of multi- linear evasion. Moreover, in the same Table (5), in the Condition Index column (bonded indicators), with grades that correspond to the relevant variables, do not exceed the limits of linear evasion (> 30).
- c. In extreme outliers and influential points detection process, their absence was determined via Cook Distance, that never received prices > 1 , via Leverage prices that never was $> 0,5$ and via metres of DFFIT and DFBETA that both were > 1 . In addition, by studying Table 1, we observe that the process of regression analysis, which was held via Listwise Method, has selected based on Cook distance, Leverage, DFFIT and DFBETA prices, 456 from the 474 cases that had initially been placed in the model, on account of missing values management.
- d. The principle of distribution regularity is satisfied via Histogram 1 (Figure 1), which shows that standardized Residuals are following the regular distribution with Gauss Bell to have symmetry and normality in the way that prices are distributed.
- e. The Scatter Plot (Figure 2), which enacts a scatter plot of Deleted Residuals against Predicted Values, satisfies the linearity and disseminates equality admissions, with patterns and systematic clustering absence.

5. CONCLUSIONS AND SUGGESTIONS FOR FURTHER RESEARCH

The basic aim of this research was the investigation of relation between the students' performance and their attendance of lectures in the frame of educational process. The aim of research was achieved with the proportional variable "number of attendances" to be the best predictor variable of research, results which were presented in the present research, which was conducted in Campus of Serres and Katerini branch (T.E.I. of Thessaloniki).

The second objective was the investigation of other factors that affect the configuration of students' performance. From the results of a) ascertainment of simple linear cross-correlations b) insertion - removal of variables in the regression model and c) model's synopsis of indicators, their positive contribution was realised.

The third and last objective was the verification of influence degree of all variables that participate in the model, in which via extraction and interpretation of the retrograde equation, the values of used variables were counted. However, on the basis of the statistical importance levels, that correspond in t prices of table 4, the best predictor variable is "number of attendance" (11,542), followed by "teaching methods" (4,334), the "attendance of lectures" (attendance of theoretical leg of lectures, 3,896), the "good attendance" (3,607), the "attendance of laboratories" (2,551) and the "good professors" (2,360). Even if the hierarchy is considered, (Dafermos, 2005) more representative of variables value, it would not nevertheless be wise to interpret their numerical classification in an absolute way because of the reserve of t prices theoretical approach.

The research has enough restrictions. Findings can not be generalised without verification. Thus, there is a need for more extensive research by employing a larger sample of students and using more variables. Also, research aiming at the examination of each variable that influences the output of students separately must also be carried out.

FIGURE 1: HISTOGRAM

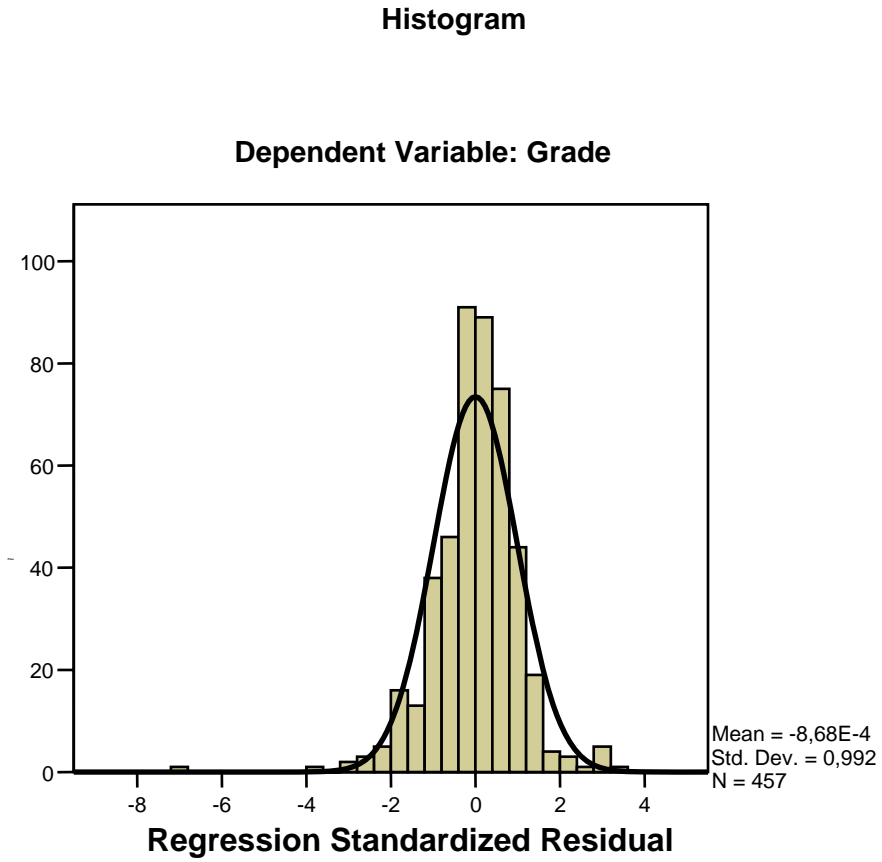
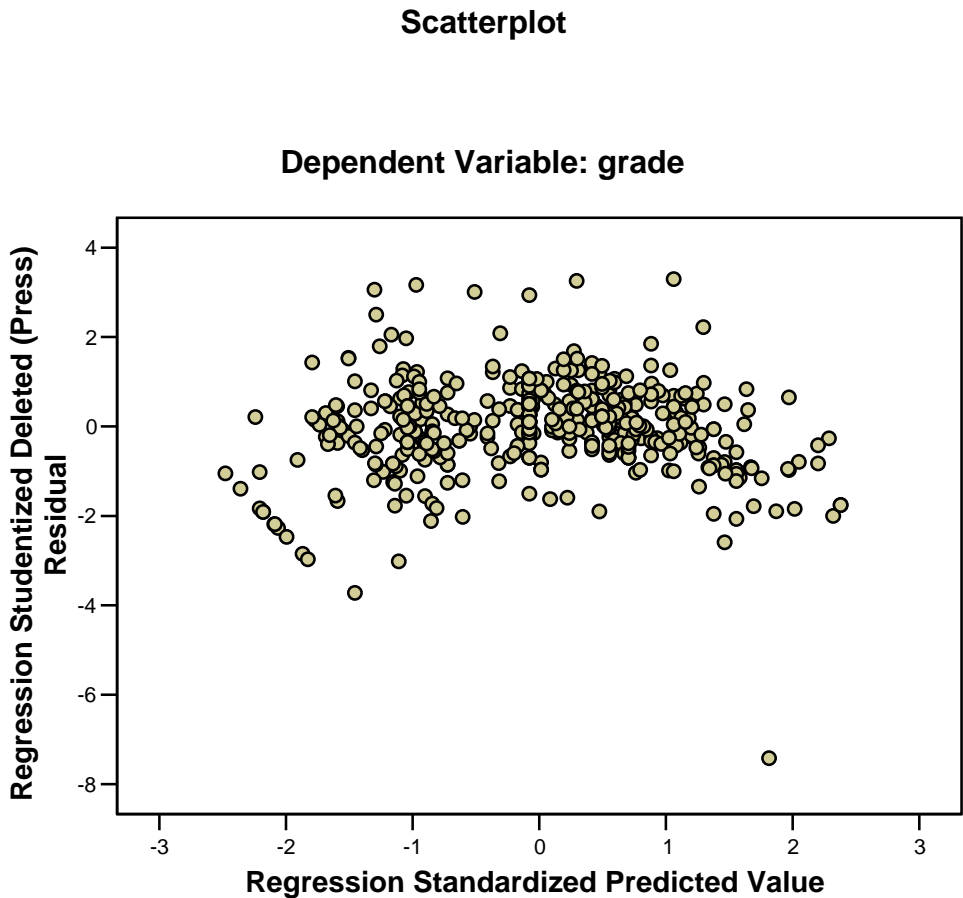


FIGURE 2: SCATTERPLOT



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ASSESSMENT AND RECOGNITION ISSUES REGARDING REPEAT VICTIMIZATION: ORGANIZATIONAL APPROACHES TO ISSUES FROM THE EUROPEAN SOUTH-EAST

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ABSTRACT

Victimology is the scientific and institutional expression of victim support regimes. This paper presents a macro-sociological approach for understanding the status of victimization in Greece. This brief overview may offer some explanations regarding this staying behind of the system of victim's support, while attempting at the same time to relate this social backwardness with current state practices on socio-legal protection. Research on the nature of the Greek polity is being carried out using a socio-historical approach, covering the nature of the rule of law and its status in Greece, the conflict between political popular strata and organised interests, both visible and unseen, sited inside and outside the state administration. Changes in the justice administration system will pave the way for the charting of this territory as emerging social crime rates appear sporadically. As is the case in point, required personnel are rather few and documentation on the crime "scene" is rather scant. Relevant police reporting is unavailable for research purposes while possibilities regarding press reporting emerge when an emergency crisis in the prison system surfaces. Victimisation, as a discipline in Greece, once established as is our obligation under European Institutions, represents a true reorganization measure for serving and protecting citizens and establishing governance.

Keywords: Victimology; Social Protection; Citizens' Rights; Justice Administration; Socio-Legal Victim's Support.

1. INTRODUCTION

This paper cannot be but provisional and a rather macro-sociological report for the concept of victimization is still in its infancy in Greece. (Some would say it hasn't arrived yet.) Even so other well established subjects such as criminology, forensics, geographical information systems and indeed applied human geography, practical sociology and psychology, all related social policy fields, still remain rather weakly developed institutionally let alone articulated organizationally as policy instruments (for "social" regulation). It is for this reason that I will give a brief overview that may offer some explanations regarding this staying behind in the police "administration"

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while attempting at the same time to relate this delay with current state practices on social and legal protection in general terms.

I will attempt here to present parts of my research on the nature of the Greek polity using a socio-historical approach to view both state and civil society. This will cover the nature of the rule of law and its status in Greece, the conflict between political popular strata found both inside the state administration and outside it including the overall problem of the citizens' right to social protection. Next I will describe the juridical regime focusing on some of its key issues as experienced by judges and related professionals. In this part I will provide evidence from a recent survey that I conducted in Greece for the purposes of the Grotius European Commission Programme, on the ICT level found in the court system and the administration of Justice. This is the closest one can get to such a topic (esoteric in many respects within the relevant personnel), as it is rather difficult to assess such levels within the Ministry of Public Order. Changes in the Justice Administration system and the forthcoming registration of penal records will pave the way for the charting of this territory as emerging social crime rates appear sporadically from Magistrates usually before retirement. As is the case in point relevant personnel are rather few and documentation on the crime "scene" is rather scant. Relevant police reporting is unavailable with some rare possibilities of press reporting when a crisis in particular field erupts.

Lastly, I will describe another parameter of the system of administration to which many "victims" seek protection from mal-administration, namely the recently established in Greece Institution of the Ombudsman. Having set the parameters I will say a few words on the prospects for regime victimization in Greece and how it can be established as a true reorganization measure for serving and protecting citizens.

2. PREAMBLE. ASPECTS OF THE POST WAR ADMINISTRATIVE SECURITY SYSTEM

The relations between states and their citizenry are not, as a general measure of understanding, uniform or even homogenous. Political history, the historical continuity and discontinuity in the national democratic forms, the established notions of social protection and the modalities of social "welfare", with their associated notions of social citizenship, all constitute and subsequently define the methodologies with which we may measure the relationship between the citizen and the administration in a national and subsequently supra national territory. The design of a certain methodology, which will allow evidence to be established for the hidden and undercover reality, which is as it is, of a citizenry without effective socio-economic representation, as is the case in many national situations, is as important as necessary. This methodology will have to be produced in each case bringing in elements of a national quality to the general development of late international social science. In our case elements of a national criminology, sociology of law, social security, social

regulated and labour standards are enforced. Unemployment insurance and vocational training are essential mechanisms that require a street level bureaucracy to share control of the streets with the police in order to keep the social peace. Of course police needs to be part of the Interior Ministry, as in most E.U. States, and not part of a discrete Public Order Ministry as in Greece.

The turbulent political history of Greece from 1936 to the restoration of Democracy in 1974, led to the hydrocephalic nature of the military security apparatus of the state giving the expression of a civil (public) order and protection defined in quasi military security terms. The Police (Public Order Ministry), the Fire Brigades, the Coast Guard and the Ministry of Merchant Marine are situated in this apparatus constituted by such norms and administrative regulations.

The establishment from above of conditions for legal rule, as prescribed by the constitutional and other civil systems, does not necessarily allow for the establishment of the rule of law in practice. To begin with, administrative law under "emergency" situations is protected in its function by laws of "secrecy" that inevitably cloud the way in which decisions are produced. The quasi- military Ministry of Public Order belongs to this family of institutions.

In many "transitional" regimes, whereby institutional orders were imposed by one side, the definition of general welfare security meant that those politically correct were treated differently in the public salaried sector than those in the "private" unprotected sector. There, extra-judicial and non-economically based categories defining the Nation (Ethnos), the phylogenetic aspect of nationhood, had to play the main role as integrative aspects for those excluded. Thus the institutional definition of the "poor", the "sensitive" population groups in all those found in "emergencies" (that were to constitute the threat to citizens in a welfare system), was political. Policy remained a political policy of containment bearing a military zone mentality and seeking out those "politically dangerous". Rehabilitation of the system is in place but it is still in its infancy, with the academic field not being ready to recognize the importance of this field.

We all know that laws, in order to be administered, require trust and an understanding that represents a mode of voluntary action in line with the norms and the moral principles of the community. The state, by accepting the rule of written Law, recognises the right of citizens to interact and associate. Its role is to side step in order to regulate whenever such agreements are not respected. In Greek affairs the socio-administrative situation has been characterised by the general incapacity of the state apparatus to admit conditions for social action, i.e. the popular democratic entry into politics and communication.

Accommodating the juridical order brings about a system of regulation based upon participation. Without that, the organisational space is filled by personal linkages, kinship ties that represent a minimum of political integration necessary for legitimacy to be maintained within the civil state (patron-client system). Greece in practice has a

very weak linkage between the juridical and the social orders. It is for this reason that atypical structures of political patronage have filled the void in our case. Under such a regime the enacted legislation has difficulties in being implemented, for different social strata may see it as compromising their interests. Legislation without sufficient interest intermediation is usually suspended in practice. Parenthetically the development of systems of local government, i.e. local support structures at the closest level to the ordinary citizen represents a normal way of addressing issues of local crime.

3. THE STRUGGLE FOR INTEGRATION IN THE GREEK JUDICIAL SYSTEM: ISSUES AND RECENT DEVELOPMENTS

As a result of the above the public system currently experiences a multifaceted crisis. All those who practice law, those who run its institutions as either juridical personnel or court administrators are in conflict with a system that lacks organisational integrity, cohesion and discreet financial management capacities.

Current efforts towards greater integration try to develop electronic registration for civil cases, accomplished to a large degree in the main Civil Courts, but as far as criminal justice cases are concerned we are still at the beginning of such a process. Similarly one is struck by the overload in the pre-trial waiting list of cases as there is a lack of ADR systems, of free-legal aid services, despite the rhetoric of the Athens Bar Association to the contrary, and systems of social-legal mediation to address issues of social conflict and interest inter-mediation. Social exclusion here is a key concept that needs to be introduced, as the "poor" for instance, require the legal status empowering themselves to a legal claim to social protection and support. A social right clearly applied in most European Union States (except in Greece).

Recognition of the right to a basic income as in the rest of Europe would certainly enhance social rights and social rehabilitation forming the economic basis for social inclusion. In that regard the enfranchisement of the voluntary sector (Third Sector) would greatly enhance such processes as in the rest of the OECD member States. Similarly a family court would clearly establish better socio-legal protection for children and women in view of the growing number of women-led households.

4. ASPECTS OF THE JUDICIAL SYSTEM

Although it is generally considered that Greek legal culture is rather polyphonic (the number of lawyers is calculated to reach 35,000 by the turn of the century), being influenced by strong Napoleonic institutions and a German administrative tradition, post war Greece did not develop those post war welfare institutions and the associated social administration that developed in the rest of Europe (such as strong local government social administration, unemployment insurance, national social security, a

general system of labor regulation, with associated labor market institutions, and a general national health and education system).

The weak welfare system has as a result a large underground economy based mostly on the commercialisation of social needs. In the meantime the formal legal environment is characterised by an over-production of legislation which has a precarious record of non enforcement. Legal production (laws enacted) during the past twenty years has been as follows: over 2,178 Laws were enacted; about 14,248 Presidential Decrees and some 17,638 Ministerial Decisions were produced. From these about 92 Laws were related to public administration (Pagakis, 1998). The post war years in Greece were marked by extraordinary politico-administrative and socio-legal changes. Great gaps in basic human and political rights developed so we can consider the restoration of democracy, July 1974, and the E.E.C. then (now E.U.) membership as landmark dates in the process of normalization and democratization of present day Greece (Alevisatos, 1986, Tsobanoglou, 1993a, 1993b).

The administration of Justice in Greece has been a priority for government policy albeit with little success. Despite the rapid development of the economy and trade relations, justice has maintained a deficit in relation to employing qualified personnel, buildings and technological infrastructure. A direct result of this "policy" has been the emergence of serious problems in the operation of Justice, namely the main result being the negation to deliver Justice (*arnisidikia*). The setting of a date for a civil case usually takes over a year and the reaching of a verdict might take over four to eight years. Misdemeanors reach the courts after five to seven and a half years while felonies reach a hearing after six to twelve years. The current setting of a date for the hearing of an appeal for a felony in the Appeal Court is the year 2011!

The General Secretary of the Union of Judges and Magistrates, himself a Court of Appeal Judge said, "There are almost 200 vacancies for judges and magistrates while there 2,400 such vacancies for justice clerks and related personnel in the county's courthouses. In the First Instance Court of Athens there are 58 vacant positions which, including sick leaves, reach the number of 70 out of a total 410 positions. In the Court of First Instance there are 25 vacant out of 125 regular positions of Judges (Athanasopoulos, 2001).

Every year about 7,000 new court decisions are produced. Every three years the volume of cases increases by almost 35%. (Donos, G., Special Advisor to the Ministry of Justice, Interview March, 2002).

Similarly in a report of the superintendent of the Magistrature of the Athens Appeal Court there is a record of some 20,678 cases for misdemeanors, and about 988 cases for felonies in the Five Member Criminal Appeal Court pending trial. In the field of Administrative Justice, the Athens First Instance Administrative Court has some 28,284 cases pending trial while in the Administrative Appeal Court of Athens there are 25,284 cases waiting their turn. At national level we have 109,583 cases pending trial in the First Administrative Court and over 37,836 at the Appeal level

(Venetis, B. 1999). Constitutional Reform is currently an on going process in Greece including the relevant decrees that regulate the "sensitive area of Justice Administration". The President of the Highest Administrative Court in a speech to the Athens Bar (12/02/2000, To VEMA, 14/02/2000, p. A15) expressed his eagerness to discuss proposals for reform provided the organisational structure of the Court and the interests of the profession are safeguarded. The setting up in place for incentives for the "quality careers for the administrative judges and the enlargement of the pool of the qualified stuff for the Council of State (Supreme Administrative Court) constitute the two parameters of the professional interest".

The Judge has said, in reference to the chronic congestion of the process in the distribution/administration of justice, that the President of the Supreme Court mentioned that the solution to this situation lies in the: 1) the rational organisation of the courts so as not to have judges overworked and under-worked, 2) the reform of the training/practice for lawyers so as not to use the admission to court of cases by reasons of personal financial need, 3) the setting up of processes for transparency in the public administration so as to persuade the citizen for the legality of the produced administrative decision".

Similarly the President of the Supreme Court in an interview to the press mentioned the following as key issues to be dealt with in the Justice System:

- * The institution for the out-of-court settlement for civil cases must be enforced. It has been legislated but its application has been suspended.

- * The system of witness's evidence without an audience must be abolished.

- * For the number of cases which reach the Appeal (Small Claims) Court, the Supreme Court must establish a system of filtering of cases so as the Supreme Court ceases to occupy itself with unfounded claims of minor importance.

- * Improvements in the "interrogation" and the "bankruptcy" law process must be made.

- * The constitution of the "justice police" must be realised.

- * The improving of the institution of self-governance of justice is also an issue.

- * Economic independence must be given to Justice and the decisions of its institutional organs must be honoured. (To Vema, 27/02/2000, A57 Interview of Supreme Court President S. Matthias to I. Mandrou.)

5. TECHNICAL CONDITIONS FOR THE ASSESSMENT OF COURT CASES

The development of information technology within the legal system may be characterized by lack of co-ordination between government departments, their agencies and independent authorities. It has been difficult to obtain reliable information on the technical supports in the overall system except in the cases referred to specifically in this paper.

The real challenge to the system is the future connection of all the Prosecutors offices themselves in a national system akin to the TAXIS system connecting taxation services nationally.

It is this suspended connection along with the forthcoming database to be built for the penal cases that will enhance the status of the judicial system.

In Greece the main volume of court cases, over 60%, are handled through the three largest First Instance Courts (Protodikio) of Athens, Thessaloniki and Piraeus. For these three courts all data registry for the Civil Cases (family, associations, companies, traffic violations, property, inheritance, commercial, labour) has been completed. Within these courts there is a full computerization of civil case records.

Courts, prosecutors' offices and lawyers can use two electronic databases: the one of the Athens Bar Association and one of Intrasoft ("Nomos") that includes Calendar, Court Records and Case Law for Civil cases for a fee of 600 Euros. At the moment, lawyers can have electronic access by modem to court records only in Thessaloniki and this does not apply to criminal records.

The Council of State's (French legal tradition) database is very comprehensive, available to lawyers and going back to 1928. The Supreme Court's (German legal tradition) have their own databases registering their own decisions but computerization is not as developed as in the Council of State.

These databases are used to provide information for the preparation of documents since they provide case law, public and private laws and court decisions. The information shared at present by these three groups, courts, prosecutors and attorneys, ranges in a variety of modes from the manual handwriting to the electronic, as in the case of Thessaloniki lawyers who can access civil and court data with a modem.

In Athens computer communication between the lawyers and the courts by modem is not possible yet, as there are no PCs available in courts and no electronic registry of either civil or criminal cases. However a pilot program has been launched in 2000. There is no expert system or any other software used for helping judges and prosecutors in the decision making process.

Criminal Courts are the new area of intervention for the electronic transcription of cases as there are no computerized penal court records and the situation in the criminal courts is the least technologically developed in the national court system.

Generally there is no case file or any other piece of information available in electronic format during the trial.

Preparing evidence for criminal cases in the Greek periphery is a rather sensitive issue. There is a regional dimension in the production of such evidence, partly due to the scarcity of technical supports available in the country's regions, compared to the facilities available in the Athens and Thessaloniki areas. There are three Forensic Services in the country, one special forensic laboratory in Athens. The other regions utilize the toxicology laboratories found in the 6 Medical Schools of Thessaloniki, Larissa, Ioannina, Patras, Alexandroupolis and Heraclion. Evidence is an area that

new technology needs to be developed and applied by the Police Authority and by the Prosecutors Office. Benchmarks and standards need to be defined, elaborated and implemented. The courts need to also enhance their operation with social scientific personnel such as criminologists, sociologists of law, legal and social anthropologists, psychologists, psychiatrists and indeed forensics. Currently, the Athens Juvenile Probation Service has one staff-person for over 2000 youngsters. There are over 8000 juveniles under "care" in Athens.

There is no national data network that links members of the legal profession with government agencies. The introduction of video and audio conferencing in the courts is not possible at present. However it should be developed as a means for ensuring the confidentiality of discussions between the defendant and the lawyers.

There was an attempt, in the year 1993, to develop caseload statistics for the criminal cases. Funds of approximately 61,000,000 Euros were allocated but were put on hold indefinitely and were never used.

Regarding the physical apparatus of courts it has been mentioned as an example the situation in the Administrative Courts of Athens whereby 734 persons, Judges and Court Personnel in all, are literally crammed in 3,400 square meters of space (Venetis, 1999). This is the reason the judicial administration is currently preoccupied with the building up of essential physical infrastructures leaving aside the soft organizational human resource side of the judicial (criminal and civil) process. During the past few years a number of deficiencies in the material infrastructure have been rectified by the building of the necessary facilities for the administration of justice, i.e. court and prison improvements.

This situation of crisis creates difficulties in the delivery of justice. For example the low level of education of the Court Secretaries, without a specific training in stenography, causes problems in the accuracy of the court records. F. Kouvelis, MP at a personal interview, stated that sometimes a five-hour criminal court session may be covered in less than five pages. Evidence may not be identified properly under such circumstances and the poor recording standards leave room for tempering with evidence. Forensic sciences have been the most sensitive to the political pressures, a situation that needs to be improved with the necessary technical investments. Decisions are also difficult to reach when the process takes that long. The temporal element is important in this respect as victimization requires resources to be focused temporally so as evidence is not compromised. It is important to provide resources for recognition of the importance spatial elements in the process.

6. ASPECTS OF THE JUSTICE DELIVERY SYSTEM

The plethora of laws, regulations and the frequent alterations of them, occurring even between the same government, creates confusion in the administration of justice.

Transparency, greater administrative integration and customer driven services fit hand in glove with new information applications.

The lack of electronic registry in penal cases makes it difficult to track down cases among disparate courts not connected between them and lacking the information basis of an electronically registered criminal caseload. This is the real challenge that information technology is attempting to address.

Problems encountered include the inadequate supply of skilled personnel to operate the system and the inadequate training support (no continuous training is in place). The weakest aspect has to do with the absence of research projects on the criminal court system. The limited number of criminologists and social science experts on sociology of law, deviance and social control and related specialties pose a rather difficult task to all those who have the task of addressing the issue of criminal justice and related fields such as victimology. Improved access to public information requires higher standards in the administrative delivery of systems of social inclusion. Applying repeat victimization methods requires a dramatic investment in ICT development and in greater transparency between "security" consideration in the Public Order Ministry and general policy developments in the Interior Ministry. The previous amalgamation between the two Ministries during the 80's was unsuccessful. Recent developments such as greater ICT development in the criminal justice field, the large flows of undocumented immigrants in need for social protection and integration, the social inclusion of "unprotected" and largely victimized sections of the population such as the poor, youth, women, will show the way for a greater integration of police work with social relevance and effectiveness. In that manner the role of local government will have to be considered.

The regime of political patronage, which occupies the lacunae between state and the "excluded" part of civil society, remains the dominant relation in the relation between the citizen and the administration, is a regime of a moral nature, that is to say a regime that is based on a moral patronage economy (Arlacchi, P. 1983). Under this regime, the very notion of employment is considered as part of clientelist relations, permeating all levels of access to public institutions. In a very basic way information is an issue for it is highly controlled and it is produced and disseminated by those in clientelist and professional control. The legal profession has been traditionally opposing to any information sharing with the administration. Their purpose has been to control basic information requirements of the population regarding socio-administrative issues such as social security, employment, and taxation. In the past attempts by the Greek administration to introduce systems of social control to the administration (1735/86 Law) were reduced to inertia.

Social controls in society are realised by "regulating" the occupational categories, the professional groups, and the general accounting infrastructure that defines basic incomes, taxation categories, and other professional groups. By licensing their activity and the basic control of work qualifications they regulate social employment

categories. In fact, the issue of professional mobility is very important in defining the process of work and political and social empowerment of the citizenry. The lack of a comprehensive system of nationally registered occupations, with their subsequent skill and professional development requirements, for example a very clear separation between mental and manual work, a clear process defined in terms of a pay scale, conditions of work, work remuneration and systems of evaluation and control pertinent to knowledge-based work indicate that social mobility is certainly not defined by the work process itself since this process is controlled politically by the clientelist system (Mavrogordatos, 1997).

While this is the case with the state institutions, private institutions appear to act outside any formal control channels since the distance of the nominal and formal in law are apart from the effective and the informal practical; conditions in the private sphere. The legal regime is part of the public space, the space of the public citizens. Outside public organisations, informal and atypical forms rule, for there is very little support in social emergency cases such as unemployment, social security and access to alternative means of dispute resolution. The absence of a recognised Third Sector to mediate between the public and the private also weakens the bargaining position of the citizens as the administration habitually turns simple process cases to litigation issues. From then on, it is money and time that determines the outcome (there is no practising free legal aid akin to established services in other European legal environments).

The weak organisational development of the economy and polity is best exemplified in the weak professional qualification regime that leaves the relation of the legal profession and of the courts to with the economic system in contradiction. In effect the role of law in the operability of civil society and its economy, i.e. the very constitution of the "circulation" sphere, the contracts and the transactions, leave out certain key issues.

The practice of law and the administration of justice, its distribution aspects and its equity formation are a "problem" currently recognised in the country. What it is not clearly understood by the elites is that further institutional participation in the EU decision-making structures requires a full scale recognition that modern "governance" structures are embedded on organisational sites that a) realise that the role of law in the "economic" sphere is the basis of the circulation and distribution of goods and services, b) a qualification regime needs to be established and "professions" need to be recognised under legal and professional standards and c) disputes need to be "regulated" at best within the place of their formation and solved in the work-place if possible.

7. A BRIEF OVERVIEW OF THE OMBUDSMAN INSTITUTION IN MODERN GREECE

In 1968 the Colonels Constitution established the Commissioner for the Administration (Gov. Gazette 274/A/23.11.68, Law Decree 2/22.11.68).

The Ombudsman institution therefore, was never really in full operation in modern Greece. The protection of the citizen from the arbitrariness of the administration was never instituted in modern Greece as in other European States. Recent experience indicates that the executive power in Greece would hardly allow the foundation of institutions that would impose a check upon its workings by empowering the citizen to gain protection on issues that concern him/her directly. The introduction by the Socialist Government in 1987 (Law 1735/87) of the Institution of Public Sector Controllers, attached to the Ministry of Public Administration, was actually put in operation by Law 1892/90 and Ministerial Decision 10/33664 (Gov. Gazette 637B/8-10-90) in 1991 by a Conservative Coalition Government. These controllers were considered then as the Ombudsmen although they did not measure up to the requirements of the Ombudsman concept; namely because they were part of the administration, as internal control on the actions of the executive. However one must notice that there are Commissioners from the Court of Audit attached to state organizations, universities, public utilities, independent agencies in general supervised by the Ministries which check the legality of all their financial transactions and are part of the Justice Department's Administration.

The introduction of Article 13 of the European Convention of Human Rights into Greek Law, ratified by Greek Parliament last year, was due to the forthcoming Ombudsman legislation. In particular, Law 2477/97 of 1997 establishes the Institution of the Ombudsman in Greece as "The Citizens' Advocate". It is defined as an independent administrative authority whose main role is to mediate between the citizen and the administration in Greece trying to implement legality. As we progress I will be illustrating the general lacunae of the citizenship conditions in Greece aiming at the production of a reference structure for the application of the Ombudsman system.

The Ombudsman mediation system is part of an ensemble of parliamentary checks on the administration. In Greece apart from the Committee on the Constitution, the "interpellations" and questions of individual members of Parliament do not seem to be in place with other Parliamentary Institutions for the control of the administration. The Ombudsman system is such an Institution and Greece could see it as such. Greece had to respond to European Union Directives and to the fact that there has been a European Ombudsman since 1995 who communicates with the Member State's corresponding Ombudsman. The absence of this Institution in Greece has caused many queries as to why the land that probably had the earlier system of complaint handling of its citizenry in the western world, during 5th Century BC Athens, has been

so slow in establishing such an institution in the twentieth century. It was eight years ago that the Ombudsman Institution was legally drafted and passed through Parliament. The way it was passed indicated that the political majority in Parliament would determine the appointment of the Ombudsman and its staff. With this the whole process of setting the institution in place has started. Firstly, four assistants were appointed each representing the key areas of investigation, administrative affairs, legal regulation-affairs, building regulations affairs, and socio-medical affairs.

The Ombudsman Institution, if it is to take root in Greece, needs to acquire staff with experience with the problems of Alternative Dispute Resolution (ADR). To begin with, the Ombudsman is an authority that searches for alternative solutions to conflicts, in the first instance, and knows the issues and mediates between the citizen: be it a student, as in American universities; a consumer of public services such as health, which are the responsibility of the national ombudsman in many states; or of private services such as banking and insurance, as in the UK and Ireland; or a worker, immigrant or child in need of protection, as in various Scandinavian states.

The Ombudsman system is basically a system of social accounting and as such it is generally conceived as functioning in a bottom - up way in which citizens use existing legislation for participating in social and economic life in their respective communities. However the modality of citizenship and administration relation is very important and it varies in each politico-administrative regime.

It is important that the Ombudsman Institution in Greece establishes itself as a new institution that will empower the citizen, establishing that is the limited relationship between the citizen and administration, in order to realize "mechanisms with accountability" and "accounting" as social audit. The citizens are the important indicators regarding democratic rule and ordering. In a country with almost half the working population self-employed, accountability remains very frail. Similarly legality is distant in practice, lacking a system of enforcement and penal sanctions. The administration therefore is weak since the system of Rights and Functions is uncharted leaving democratic accounting suspended in mid-air. The weak system of enforcement and the lack of criminological orientation are coupled with the lack of understanding of the socio-legal issues involved in the production of law and its practice. The interaction between the legal and the social system is practically undocumented. Laws are produced in a number of forms with those of the presidential decree type being the majority. They are being produced without much communication and coordination with the field, which they are aimed at. They seem to represent general laws, requiring interpretative circulars in order to guide their application. The weak professional development in civil society leaves those decrees to "regulate", as in the nineteenth century, on how doctors must practice surgery etc. Regulating professional practices is an important part of regulation in modern times but this mediation is not an imposition on scientific grounds and it is being done in consultation with those in question.

The lack of enforcement in Greek workplaces of the E.U. regulatory statutes regarding health and safety at work represents a complex issue for the researcher of citizenship issues in the country. If such basic rights are not observed because of lack of systems of monitoring and enforcement then other equally important social citizenship rights regarding social benefits and public goods may also not be in place. The effective empowerment of the citizen will inevitably create a new pole of attention, a point that will be a social reference for the politics of the citizen. The Ombudsman institution will have to establish this space in Greece as a public benefit organization. To do this it will have to establish a real independence from state nomenclature and discover civil society.

There are categories of the population that are excluded and therefore may claim to be recognized as social victims giving rise to social crime such as drug-related crime (undocumented and documented immigrants, unemployed youth, youth, pensioners and the "poor"). These large social population categories are not "protected" on par with established minimal living standards in the EU. Basic Income, is neither established nor widely debated or a universal social protection regime for the elderly or women. Youth are not represented by the Trade Unions and they are excluded from the labor market.

The Scandinavian social democratic welfare regimes (Olsen, 1987) and increasingly the European Union wanted to base European Citizenship on the concept "active citizenship". It is this characteristic that defines the notion of the Ombudsman, one of the most important contributions of Swedish political culture to the world. This institution requires strong national solidarity and a culture of openness in the relations between the administration and the population. It also requires strong workers solidarity and a strong sense of tripartite cohesion when decisions need to be taken. It is this system which brings the Ombudsman system into operation and encourages the emergence of new forms of public management and citizenship participation, in particular the information society.

8. VICTIMOLOGY: FIRST STEP TO SOCIAL PROTECTION

We will now turn to the issue of social definition of concepts such as "Victimization". Victimisation requires the establishment of victim recognition, rehabilitation and "care" or support. Those enforcing the laws of the land must produce evidence. Victim support denotes crime has a specific cost that may statistically be identified in time (certain periods of the year such as summer, winter) and space (certain neighborhoods). Systems of victim support emerge as other welfare measures become prominent. In states with a "weak" social welfare regime, "protection" and victim support appear within the protected state administrative sector and their form may vary in the "free" private sector. There are ecologies of victims even if they are not recognized as such as in the largely "undocumented" private

sector, for recognitions denote responsibility and responsibility means evidence and claims for "support". Whether accidents happen at the work place or at school (bullying for instance) in "emergent " regimes of the transitional type the cost of them might become fused over time and space making it next to impossible for the victim to gather, as it is required evidence in order to draw "protection". Because "protection" in such weakly constituted social systems is not established by virtue of the state resources to both the public and the private sectors. The informal and disenfranchised non-state sector is precarious and must establish claims for inclusion, access to work, contracts, education, credit, licenses. It must seek to regularize labor standards in a precarious working life devoid of "security", pensions, health, and shelter for the family. Seeking to establish the right to support is similar to the seeking of inclusion via the political; patronage system.

Inclusion means the possibility of insertion into the wage relationship, with possibility of unemployment insurance, a benefit system for the family. A generalized crime prevention and support system usually occurred within state corporatist systems in transitional societies. However the limited space occupied by such a system of state corporate organizations such as state utilities for instance, within the overall State, means that informal, unrecognized, repeat victimization (undocumented) and therefore non-existent constitutes the socially important field giving the general hue to State of Victimization as a concept. In Greece for example such a concept is not workable at present but it must be constituted as such. The issues surrounding its unearthing and proper institutional recognition must be recognized by the social science community first.

When it takes over 7 years for a case to be tried in court and at a great cost, when Alternative Dispute Resolution (ADR) and other mediation schemes are not in place and conflicts are endemic, one tries not to look back. In many cases evidence is purely a matter of resources one commands at his/her disposal during a very long process in receiving justice. Weak social protection institutions for those "populations" in crisis such as youth, women, the handicapped, the long-term unemployed and immigrants, denotes that the cost of unemployment insurance and social benefits is next to nothing. Therefore, it is the uninsured individual family that will bear the cost of poverty, sickness and education. Poverty and welfare are hand in glove with social protection and generalized employment and training. Police administrations have historically constituted the state institutions that regulate the poor using both prevention and information / detection as acts of social governance. They bring together data for regularities of crime's victims, the offenders', and the localities in order to have the social geography of crime in a general manner. The mapping out of regularities in crime allows for the centralization of data and the development of clear preventive criminal policy concurrent with victim support and rehabilitation / compensation.

In the Greek case responsibility for crime/accidents is dispersed, and so are the costs, which thus appear as minutiae and therefore negligible. Responsibility is

therefore spread over a very wide area and becomes a phantom. It is very difficult to prove when the infrastructure for statistics is insufficiently developed and very restricted even among state institutions. In this way innocence and guilt are relational categories and all those in the unprotected, non-state sector are "guilty" for the political administration unless they prove their innocence. They are guilty because they are not politically enfranchised and therefore their status is that of a non-citizen. A citizen has rights to social protection as part of his citizenship status. If he is outside the "normal" parameters of the state he is likely to be because he lives in the wrong place and has the wrong relatives or even the wrong beliefs.

Modern social welfare administrations through social inclusion systems, via health and social security, establish support systems and define the new parameters of social pathology and of victimology. A victim may seek support for cases such as being an immigrant, residential criminal, drug-user and for cases such as family violence, school bullying, road and work accidents, commercial robbery, credit and fraud economic crime, car crime, retail sector crime, local disputes and the response will depend upon the nature of local/national governance system.

Greece, to this day, failed to develop Criminology as an important early social science that would supervise the conflicts between Rights and Functions among the social actors, the new social administration, social protection and the citizen.

9. EPILOGUE

The aim of this historical detour was to describe the institutional field in this important area and to explain the reasons for developing a serialization of the political economy of rights of the citizen and the rights to support those in need.

Welfare protection is essential as an institution in order to understand social citizenship and the importance of empowerment for socio-criminal help, rehabilitation and mediation. Unification within a state allows for the standardized measurements, sufficient to establish uniform rules for the general inclusion of people in "need". In modern regimes the construction of victims is social. Forensics and statistics are essential elements for social governance and control. Proofs and evidence need to be scientifically established and registered otherwise the victim is not recognised. The concept of the victim remains the property of a regime that recognizes "social rights" and maintains a system of legal and social protection in enforcing those nominal rules that are not "effective". If the distance between those levels remains high and there is no mediation, or other means such as free legal aid, a strong voluntary form for "protecting the meek and weak", free drug rehabilitation, then the victims are silent and invisible. They usually are "minorities", children, women, and rural single parent families, older pensioners excluded from rights for livelihood.

If the private sector is unregulated, the farmers meet the police on the rail trucks, the workers occupy the streets demanding safety at work, protection in ill health and

old age, while youth remains unemployed, those large scale social problems cannot be regulated by a Public Order police system in a state that is part of the largest (federal) market in the world. This market requires new civil measures of social nature to handle social problems and conflicts of social nature as in the cases of social minorities (single parent families, drug-addicts, immigrants - there are over seven ministries each involved with its own legislation, yet, there is no Immigration Authority), child support schemes, child protection, victim support systems etc.

The concept of victimization needs to be established in Greek institutions along with other associated institutions such as criminology, sociology of law, "local responsible administration" and policy sciences essential instruments for governance.

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Assessment and Recognition Issues Regarding Repeat Victimization: Organizational Approaches to Issues from the European South-East

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TRUST..., THE SERVANT OF TRUTH?

GEORGIOS MARKATOS*

ABSTRACT

Seeking for truth was Odysseu's Ithaki, and will be the quest of humanity. However, many obstacles make it difficult to be reached, especially when personal interests and power of states are involved. People carry the two very basic elements of their identity: their own ontologism and at the same time their continuous epistemological background. The combination of both reflects the researchers approach to seek truth. Can these two elements coexist especially when political mindsets are involved? The article concentrates on explaining the two methodologies inductive and deductive, and the proportion that has been used between the modern and the ancient research.

Keywords: Epistemology; Ontology; Inductive and Deductive methodology; Philosophy; Political Philosophy; Modern Research.

1. INTRODUCTION

Truth cannot be found and knowledge will never be totally reached. Pythagoras once said that: *"people can not own philosophy but only flirt with it"*. A person sees it through his own prism according to his ontological stand and epistemological assumptions. From the very beginning however, philosophy has claimed to be rigorously scientific the so called "natural philosophers" (Hunt, 2005) often by promoting parallel a science that fulfills the expectations of higher needs and allowing a life from an ethical-religious point of view, it regulates clear rules of cause (Husserl, 2000). Philosophy however could never meet the fact that it is strictly scientific although it had tried at all times to do so, especially right after the Medieval Period during the Renaissance. It is a fact that the first writers after the Medieval Period claimed theology not as the literature of wisdom but as a scientific branch (Kenny, 1994). As Husserl supports, philosophy instead of trying to surrender itself with simpleness to the urge to philosophize, it had tried unsuccessfully, to form itself as rigorous science. It could not succeed anyhow, due to the many variables that constitute philosophy, something also strongly upheld by Kant's confession: *"Nobody can learn philosophy only to philosophize"* supporting Husserl's view. The philosophers are able to perceive truth and analyze knowledge with each other because they have similar but never the same epistemological backgrounds. Their ontology however, differs, and that is the indubitable privilege of humans. Besides, these two elements: the epistemological background of the philosopher that tries to outbrave his

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/her philosophical thinking and his ontological stand creates the so called “multifaceted” and endless philosophy.

Based though on their similar epistemological backgrounds, cultural and social locale and the similarities in their approaches in seeking the truth, philosophers and researchers have created rules that portray their image of what truth means to them and how to attain it, subsequently devising similar methodologies “*strategies*” Inductivists - Deductivists, - the two approaches will be discussed later- that will help accomplish their research. What truth could be for one person could be the approximation of truth for another. Tarski’s objective truth for example opposes the subjective truth of the correspondence or the coherence theory. He maintains that the latter confuses truth with logic and adds that even the evidence theory mistakes truth with the “known to be”. Tarski’s thoughts are that an objective truth could be objective even when nobody believes in it, but takes it for granted (not very different to what philosophy is all about, seeking for the truth and taking for granted laws that have not been rejected yet) , or it could be wrong and nevertheless everybody accepts it. The latter, however, contains a lot of contradictions, so that many philosophers who combine philosophy with “belief” would reject it. That of course, was only one example of how truth could be seen or described by a philosopher who talks out of self-interest and for the sake of knowledge. Imagine the complexes and barriers truth faces when political and economical interests (reality for some people) are involved. Cyprus for example is an island of no more than a million inhabitants, still divided, waiting for a political-diplomatic resolution to its problem. Three guarantor countries, the United Kingdom, Turkey and Greece see the truth of what took place in 1974 differently. The assignment’s objective is to analyze one parameter of truth. That seen as a social - political phenomenon and the role it could play - if it does - to peoples lives. What is truth for the Greek Cypriots could be the approximation of the truth to the Turkish Cypriots, and vice versa. The pursuit of truth does not require only the scientific knowledge that will decide a person’s epistemological position. It needs an ontological liberalization from narrow egotistic certainties such as nationalism, self-interest, selfishness etc. Williams (2004) notes that “accounts which have been offered as telling the truth about the past turned out to be biased, ideological or self-serving”. Concluding the assignment’s purpose is to help the writer to “know thyself” during this philosophical trip, where he will understand and enhance his epistemological level and carve out his ontological awareness, or in other words Heidegger’s ‘*Erfahrung*’ – total empiricism.

2. BEING INDUCTIVE OR BEING DEDUCTIVE

It is true that humanity lives an era of patterns. Rules and regulations are involved and interfere in people’s daily life and straight-jacketed procedures compose what is called routine. Unfortunately philosophy and research could not escape either. The

introduction of inductive and deductive methodology as a study for the researchers to follow, or the distinction of epistemological natures, could some support, clear the files of the researches and made life easier for the people who study for and about research. Some others though could argue that it had also narrowed the possibility of the intellectuals to search for “*thyself*” for life. Philosophers did not study the two approaches in order to seek the truth and quest for knowledge. They just did it. Neither philosophers had to read books and journals to know *thyself* first and then research, following either a positivism or post-modernist epistemology or any other. Actually they never tried to find out about Socrates’ *Know Thyself*. Why? Perhaps because philosophy, (philosophy can take the meaning of many other words such as knowledge in this case, or, truth, science etc), was not so mature yet or perhaps because philosophers realized that the *Know Thyself* is as vague and remote as philosophy. Of course there are remarkable differences between the philosophy-research of those times and the present day. Perhaps specialists should make a distinction between, ancient philosophy, in which basically the scientists and intellectuals of that period continuously searched for answers, and modern research which seeks specific answers in specific areas. In other words, as difficult as it is in a satiate market such as this one nowadays to find pure entrepreneurs, it’s almost as difficult to find pure philosophers. Lets see however epigrammatically the meaning of inductive and deductive methodology. “*The aim, as far as I can see, is the same in all sciences. Put simplicity and curiosity, the aim is to make known something previously unknown to human beings. It is to advance human’s knowledge, to make it more certain or better fitting... The aim is...discovery*” (Elias, 1996).

The deductive and the inductive methods are the two scientific methods which are referred to by the generic name of the scientific method. The first that gets researchers attention is the fact that as *scientific methods* they have a difficult name to distinguish, given that in a linguistic context they can represent just one concept with two statements: reasoning in one and direction in the other, from general to specific, or vice versa. Logically, the problem is derived from the conceptual difficulty of clearly separating one scientific method from the other; obviously, the chosen terms do not help retain these two concepts of scientific method in memory. Although the deductive method is the more appropriate of the formal sciences and the inductive of the empirical sciences, nothing prevents the indiscriminate application of a scientific method, or any other method, to a particular theory. Perhaps as many researchers believe, the fundamental difference between the *deductive method and the inductive method* is that the first aims to indicate, through pure logic, the conclusion in its entirety based on a few premises so that the veracity of the conclusions is guaranteed, that is, if the applied logic isn’t invalidated. The axiomatic model proposed by Aristotle is the *ideal scientific method*. On the contrary, the inductive method creates laws based on the observation of the facts, by generalising the observed behaviour; actually, what is achieved is a type of generalisation without obtaining a

demonstration of the aforementioned laws or set of conclusions through logic. Such conclusions could be false and, at the same time, the partial application of logic carried out could maintain its validity. For that reason, the inductive method needs an additional condition in which case its application would be considered valid provided that there is no case that does not fulfil the proposed model.

The term deduction is important in understanding theory construction and, as Gilbert (1993) proposed, it offers a useful clarification of the terms in the business research context (Riley, 2000). Deduction is a study in which a conceptual and theoretical structure is developed and then tested by empirical observation; thus particular instances are deduced from general inferences. It is referred to as moving from the general to the particular (Hussey et al., 1997). The stages of deduction research begin with theory and the procedure of a hypothesis, the expression of the hypothesis in operational terms, which propose a relationship between variables, data collection, and the testing of the hypothesis to deduce explanations from particular phenomena and modify the theory in the light of the findings. (Saunders et. al., 2003) "In the deductive method, the testing and confirmation of hypotheses effectively constitutes a contribution to theory and possibly to the evolution of that theory" (Riley, 2000). As stated, variables, data collection and testing are fundamental components of the research and more specifically in the research design. If somebody attempts to use a metaphor, is inductive methodology more like what an entrepreneur does or more like what scientists do? In the deductive methodology the researcher decides the concept he/she will investigate. He will set the rules and he will clarify the subject's title and also set clear instructions of what should be observed and what should be avoided. The empirical findings of the research, during the deductive methodology, must be tested out so as to confirm their compatibility. In inductive methodology the process is almost the opposite. The conception of the new product (using business language), the new hypothesis in research terminology, takes place via the process of observation without taking for granted a logical statement as a starting point (as a theory). The researcher first observes and then generates understanding by creating the hypothesis. What comes first the Inductive or the Deductive or which one is better than the other will not be discussed here. What is certain though is the fact that both are needed for the "construction" of humanity's epistemology.

3. THE HISTORY OF PHILOSOPHY

The best way of approaching philosophy is to ask a few philosophical questions: How was the world created? Is there any meaning behind what happens? Is there life after death? Etc. A lot of aged enigmas have now been explained by science. Philosophy basically has been through two major epidemics: the Ancient Period and the post-Medieval one. Both periods are characterized by the quality of intellectuals and scientists who participated in the creation of the philosophical atmosphere of the

period. They had tried, in their own ways to imprint their own thoughts of what truth was and how knowledge should be gained. What was common about the two periods was the fact that: philosophy bred and matured fast, unfortunately under a very hostile and unstable environment, which as a fugitive, had tried to escape from the social and political establishment of the states. Philosophy had a similar expansion in comparison to a human beings psychology: Firstly, it appeared to have a more epistemological Cosmo centric character, in an attempt to seek answers involving nature and the physical world humans live in. Then, as the readers will recover further on-philosophy became more anthropocentric, relating humans to their social environment and their pursuit for truth and authentic knowledge. Maybe it would be unsafe for someone to claim that the inductive approach gave its position to deductive methodology but it seems to conceal lots of truth.

4. ANCIENT PHILOSOPHY

Let's nevertheless, go over some information as to what Philosophy was about for the ancient Greeks, and its relationship to the ancients' daily life. Historically Philosophy was born in Asia Minor; the Greek islands bordering Asia Minor and southern Italy or Sicily; the area also called by the Greeks "Megali Ellada". Philosophy began - something which Anaximander opposes by claiming that it started from the Arab world- when the Greeks had "decided" to explain and map out the unknown phenomena of that period. As Hamlyn (1987) notes, Philosophy, an almost male-dominated discipline, had nothing to do with religion and churches "*Ieratia*"¹, a belief that is also supported by Yianoulakis (2006), who in his turn notes that those who taught Philosophy were barred from the priesthood. Philosophy had also nothing to do with the political status quo and was not supported by the official states (government of the state)². None of the philosophers was Athenian³ or had lived his entire life in Athens, the only city that accepted philosophy with tolerance and hospitality. Most of them lived in Minor Asia, Ionia and Sicily. The philosophers never attempted to associate ancient Greek civilization with philosophy either. On the other hand, they believed in eccentric things and lived their lives in an isolated manner and ended up either dying when very poor, or murdered by their accusers. For the ancient Greeks truth had nothing to do with what people mean today. Truth then was the Non-latent: "*Min Lanthanon*" the "*Min Tetrimenon*". In order now to establish the difference between Right and Wrong, since they could not base it on any solid fundamental traditions or for the cause of any adaptations, they had to base their methodology on arguments (Bourlakis, 1987). Truth has its routes in democracy and its meaning is probably paroxysmal. Truth is what cannot be hidden, the obvious. Truth co-exists and doesn't come to overlap knowledge. For the ancient Greek philosophers truth is not twilight. At the same time they believed that everything that is claimed to be truth is only so, under the laws humans created to be true "*kata*

sinthikin". As long as these laws seem logical and are acceptably retained (a rather pragmatic attitude) then truth is followed and supported. The spread of ancient philosophy had lasted for a period of two hundred years, from 600 B.C. until 400 B.C.

The first philosopher was Thales from Miletus (in Asia Minor). The fact that he had spent all his time in his birthplace without being exiled was not a coincidence. Firstly, because during that period the local "Ieratia" did not have much power and Thales was thereby, free to express his ideas and thoughts. Secondly because of the fact that in his lectures he always spoke about nature and that everything is Godlike and that all things are full of Gods – therefore he did not deviate from the local religious belief. Aristotle said that for Thales the "first principle" was water and that everything owes its existence to that. Philosophy though was not something that could be achieved unless the person had all the time needed to study and contemplate. Following Maslow's hierarchy, in order for a philosopher to be able to philosophize, he should at least have the financial luxury to do so. In other words, in order to be able to reach his "*self actualization*", and "*feed*" his curiosity by spending time on science and the pursuit of truth, this required the precondition that he had already fulfilled the rest of his "human" needs: shelter, food, clothes. And that was the third reason that helped Thales and all the other philosophers, in their deep pursuit for truth and knowledge. As he was a good meteorologist, he predicted favourable weather conditions for the growth of olive trees. He then bought all the olive mills for the production of oil and achieved a monopoly in the market. He later spent all the money he had gained for the quest of knowledge. But he was not alone. Most of the philosophers acted similarly spending their fortune to travel and seek the truth.

After Thales, Anaximenes followed, who claimed that air encloses everything. He thought that the source of all things must be 'air' or 'vapor'. He was of course familiar with Thales' theory of water but he supported that water was condensed air. Anaximander, Thales' successor, who first invoked what he called "*Aperon*" - the infinite - underlining at the same time the four traditional elements - earth, water, fire and air. It was the commencement of true science and knowledge leaving behind the boundaries of dogmatic truth and knowledge which, until that period imprisoned thinkers into a belief that everything was created by the Gods and that their existence was too complicated to be studied. His belief was that the world was only one of a myriad of worlds that evolve and dissolve in something he called boundless.

Philosophy had continued at Miletus but this time with Pythagoras, the first traveler as Yianoulakis supports. Traveling in those years was undertaken either to exchange products or to investigate - spy - on different "worlds" and societies. Pythagoras did that very thoroughly, spending his entire fortune. He was a very eccentric person who believed deeply in friendship and claimed that you can see someone's personality via his/her friends. Many modern historians believed that he was a contradictory person who left Samos (his birth place) because it was under a dictatorship, but years later he went on to create his own personal dictatorship in his

school, with him being the “Big Brother”. It was a very strict school with many rules and formalities. Pythagoras was a strong supporter of the idea of the existence of one God -and it was probably the beginning of monotheism- and that the world and maths are coupled. Christians later on, would call Pythagoras one of the first prophets. After Pythagoras, Xenofanis followed the first philosopher who upheld the existence of one God that resembled humans’, a statement similar to what Jesus said centuries later. From about 500 B.C. there was a group of philosophers in the Greek colony of Elea in Southern Italy. These Eleatics quest for truth revolved around the question: *How could one substance suddenly change into something else?* The epidemic of philosophy continued with Parmenides, Heraklitus or the “Skoteinos”⁴ and Empedocles. Apart from the first, the other two believed that ‘everything flows’, “*Ta panda rei*” and that humanity is a cruel and unrepentant beast that treats nature cruelly and selfishly. The most important of those philosophers and a big contemporary of Heraclitus was Parmenides. He thought that everything that exists had always existed. This idea was not alien to the Greeks. Nothing can come out of nothing and nothing that exists can become anything. That was taken for granted by the Greeks who believed that the world was everlasting. Anaxagoras, another philosopher of that period 500- 428 B.C. supported previous philosophy especially, Empedocles thinking that something of everything gives us everything. He could not accept for example the fact that one particular substance – water - might be transformed into everything, nor that earth, fire, water and air to blood and bones. He held the opinion that nature is built up of an infinite number of minute particles invisible to the eye! Last of the so called natural philosophers was Democritus (460-370). Following Empedocles thinking, Democritus assumed that everything was built up of tiny invisible blocks, each of which was eternal and immutable. He called these smallest units ‘atoms’ (un-cuttable).

Leaving the era where the first philosophers were looking for answers in nature, philosophy and the quest for truth has been transformed to become more closely related to humanity, and the quest for more anthropocentric answers instead. Probably because they realized that the pursuit of knowledge has only one receiver: the human being. The ancient philosophers tried to use “*logic*” in order to explain things that in those days seemed supernatural. It was Klimis Anaximander, the ancient philosopher who first supported the thesis that philosophy had started from Persia and from the Arab world and that what the Hellenes (Greeks) did was, to rationalize and write about it. Truth unfortunately had continued only until the time it was forcibly stopped due to the Roman and later the Ottoman empires, when Greece could not maintain any philosophical or scientific development. The innovation of the Hellenes until that time was phenomena like: “winter comes before summer, put it under the umbrella of a set of laws”. These were laws that not only the mortals but also their Gods had to follow and be ruled by. Later on they tried to find solutions to explain these laws and also to categorize them via a series of sets of experiments. It was the beginning of philosophy but also the beginning of the “*sophists*” (wise men) and their “*sophisties*” (wisdom).

Humanity owes much to these experiments since it was the break out, from the Dark Age and the unknown phenomena, which until that time were, taken dogmatically, to the period of investigation and pursuit for answers.

It was at that period that Socrates had made his appearance. Socrates was of the very few philosophers who lived and taught in Athens throughout the whole period of his life. He was a philosopher but not a scientist and the reason for claiming that is the fact that his education was very limited due to his lazy character. Socrates was not highly educated and was rather lazy in learning. What was so special about Socrates though, was the fact that while the pre-Socratics concerned themselves with questions about the natural world, Socrates for the first time applied the same rationality to human behavior and social institutions. While the previous scientists were more cosmocentric, seeking for answers about nature and the world's biology, Socrates was much more anthropocentric and on the lookout for answers linked to humans, and how these would have helped them, -a very pragmatic stand really- an idea agreed on also by Magee (1976). Socrates' major belief was Know Thyself - "*Gnothis Afton*" - in which, as he claimed, only by gaining that knowledge could a person be able to approximate the truth. Perhaps for Socrates truth was a very subjective business. He created, from an epistemological point of view, a rather skeptical approach – nevertheless a very gifted one- of asking continuous questions during his conversation. In this way he led someone into realizing how little he knew about the subject or how wrong the truth he believed he knew was. Many readers would argue concerning the relation between skepticism and Socrates. The word can be used if we follow Williams' (2004) proposal, which claims that a "skeptic" is not necessarily a person who doesn't believe in truth and the quest for knowledge. He is always questioning the truth, but doesn't deny it. Those who deny it are simply called "deniers".

Antony Kenny (1994) noted that during the pursuit of knowledge many so called philosophers tried to pervert the truth on behalf of their employers. That led to combat between Plato, Socrates and other Sophists against those fraudulent philosophers, the "*Pseudo-Philosophers*" as they were called. As Socrates said many times "*It is better to know nothing rather than knowing something wrong*". And he continued by saying that: "*people will be hurt more through finding out that they know the wrong truth rather than through knowing that they do not know the truth*". (Kenny, 1994) Of course that caused the frustration of his followers who nevertheless liked his honesty and realized that they should carefully regard what they know and what they have learnt.

Continuing the philosophical outbreak a well known figure was the Sophist Plato who believed that:

"None of the gods love wisdom or desire to become wise, for they are wise already - nor if someone else is wise, do they love wisdom. Neither do the ignorant love wisdom or desire to become wise; for this is the grievous thing about ignorance, that

those who are neither good nor beautiful nor sensible, think they are good enough, and do not desire that which they do not think they are lacking.”

(Plato, Symposium 203E-204A)

Plato traveled a lot and in between his traveling wrote the dialogues. He was not good at all at writing essays and that was the main reason he expressed himself via dialogues and poetry. Many researchers including Yianoulakis believed that Plato was a genuine philosopher like Socrates but that Aristotle was a genuine scientist. Plato disliked Democracy because he found it hypocritical, and he was a great supporter of feminism. In ethical terms he showed himself a puritan but his social behavior was very libertine. He had in many cases a very rationalist –epistemological framework that will be discussed later- and in other cases very mystic. He was both against tyranny and a strong supporter of totalitarianism, apart from the fact that he taught and supported discipline as being more important than the freedom of thought. He associated knowledge with “*logos*”, with the understanding of the reason why (Hamlyn, 1987). He believed that true beliefs could be turned into knowledge; a primitive rationalist approach epistemologically (which was improved later on). Aristotle, Plato’s student who as a straight-laced Professor, taught epistemology and science, had noticed all these contradictions. He was one of the first philosophers who had tried to code the “right thinking”, in other words the irrefutable procedures of syllogistic thinking. The Aristotelian syllogisms had prototypes of structure arguments that always gave the right results as long as they had started with the right conjectures. For example: “if Socrates is human and humans are mortals then Socrates is mortal”. He created the Lyceum⁵ - a word that exists until today - and he was the first philosopher who established the Open University. Aristotle was a genuine teacher who believed that only the educated people are alive, and that the most important thing he gained from philosophy was that he learned to do things because he liked them and because he had to follow the laws. What he probably meant by that was that he could understand the laws and rules and the reasons they were written, unlike un-educated people who could not analyze them due to their lack of academic and scientific background, and only followed them because they were told it was a good thing to do so. Aristotle is perhaps the originator of formal logic and nowadays could be claimed to be epistemologically a logical positivist. For him science was an investigation of the shapes that nature takes, which is an incongruity between science and superstition.

Another contrast between them was the fact that Aristotle’s conception of the soul was that the “soul is a form of a living body equipped with organs”, when Plato and the Pythagoreans offered no explanation in that area. He connected logic with the soul supporting that the soul is divided into two “parts” the “*Alogon*” and he probably meant the human as living organism, and the “*Logon*”. The soul functions either in a “*Fytikon*” way or based on the knowledge of the organism, “*To kyrios Logon Echon*” or a combination of both “*Epithimitikon*”. The latter combines the organism’s nature and knowledge, and therefore the belief “*Logos*” is according to

Aristotle more ethical when the second is more intellectual (Limbourlis, 2002). Thinking epistemologically, Aristotle could be named the leader of logical positivism. The Aristotelian conception of logic was the dominant form of logic up until the advances in mathematical logic in the 19th century. Kant himself thought that Aristotle had achieved everything possible in terms of logic⁶. Aristotle divided science into three main categories: practical science which concerned human acts, the qualitative, which concerned the production of useful things and the theoretical, which concerned the pursuit of authentic knowledge. The latter type of science was also divided into three categories: the mathematical, was concerned with things that have no special existence and do not change; physics, was concerned with things that change; and the theological, which considers things that have special existence and do not change (Limbourlis, 2002). In closing the ancient “epidemic” of philosophy, it is important to remember Epicurus. He was the first who supported that philosophy is a form of science, a stand that continued to survive until Kant’s period.

5. THE MEDIEVAL... EPISTEMOLOGY

Ancient Greek philosophy went on to surrender its position to Medieval philosophy. This is the period during which philosophers do not seek only scientific or social answers, but also seek to understand the philosophy of good and evil. It was also the beginning of epistemology as the one of the core areas of philosophy, a position firstly supported by the ancient philosopher Epicurus as already discussed. Many researchers believed that During the Middle Ages, in which philosophy was treated as a form of science, it faced a period of “repression”. Until the 13th century, philosophy leaned towards Plato’s. Aristotle, until that period, seemed to be a “second significance” philosopher. Everything discussed or pursued - in terms of knowledge - was circumscribed, according to the church’s values. Augustine, one of the Medieval philosophers, with a very Platonic perspective saw the world as being very hierarchically ordered. For him God now takes the position of Plato’s “Agathon”, or the good. Angels on top of humans and the bad Angels below them. The period for the quest for the knowledge that answers ontological questions passed, and left this period with a “conflict” between God and Evil and the explanation of these. Augustine supported that there is no measurement between Good and Evil. Both are incommensurate, and there isn’t a scale by which they could be measured. Evil according to Augustine is not the absence of Good but it’s constriction. The difference is in the way people think. He tried to drop many hints regarding freedom of thought and speech and also to stimulate people to continue to seek the truth, knowledge or freedom, but always very carefully so that he wouldn’t disturb the theological concern of that period. Voithios (another philosopher of the Medieval Period) had also to point out the fact that free will and must be compatible to the past knowledge of God. Unfortunately between 500 A.C until 800 A.C philosophy countenanced a huge

spiritual lethargy that continued until the Carolingian renaissance. It is after the 12th century that the monastery schools started moving around both literally (from one place to another) and metaphorically via exchanging views and theories. Also during that period the first Cathedral schools opened as well as the first Universities (*Italy 1150 and France 1200*). The constitution of these Universities helped the translation of many ancient treatises especially those written by Aristotle and therefore the first discussions concerning church dogmatism such as the trinity always in apprehension to face the consequences. Unluckily the philosophers of that period were not well prepared to understand many theories, which led to the creation of a cluster of theories and consequently failed to support them against church dogmatism. Akinatis on the other hand succeeded in introducing Aristotle to the Christian thinkers.

That was the beginning of the meta-Medieval period and the beginning of the pen minded and constructive thinking. One of the most important philosophical examples of that period was the philosopher and rationalist Descartes. He studied astronomy and metaphysics and he tried via these to communicate important messages regarding philosophy. After a very poor philosophical period, Descartes attempted to stimulate the interest of many thinkers and intellectuals of that period into the search for truth and knowledge. He tried to create a circle of people where he had sent his philosophical doubts - *later called "Meditations"* regarding truth and knowledge, seeking answers. In his Six Meditations –each one of which is an important book with the thoughts and positions of the intellectuals and thinkers of those years, for different subjects that engrossed their curiosity that period, and even until today -, Descartes had tried to get answers after positioning himself, always vigilant not to go against the epistemological status quo of that period (the rational and dogmatic status of certain truths that the Catholic church had enforced). Descartes' work was unique and dangerous at that period because of the fear of being executed as a heretic. He "forced" people not only to think, since humans always did, do and will do so, but also to express themselves concerning several issues. Descartes' "*Cogito Ergo Sum*" - I think therefore I am - was his major belief, which however went on to become the reason for serious arguments and deceptive thinking between many intellectuals until this day. Does somebody sit on a chair because he thinks the chair exists? If he doesn't think of the chair's existence, will he fall? Descartes' closest friend was Mersenne and his meditation continued via him. Another thing that should be mentioned here is the quantity and quality of the answers he gained in order to build up his meditations. The first Meditations –which were very well written and analytical - were from the Catholic Theologian Caterus (Latin name from Johan de Kater). The second, but not very nicely written - *rather superficial and short* - where ascertained by different Theologians, mostly however from his friend Mersenne. In the third as Vantarakis notes (2003) Mersenne was inconsistent since he gave Descartes' Meditations to Thomas Hobbes. Descartes did not seek answers from a Protestant as Hobbes was and that was shown from the fact that he disagreed completely with him on all points. The

fourth meditations came from the French philosopher and theologian Antoine Arnauld, the fifth from the French philosopher Pierre Gassendi and finally the last one (sixth) again from various philosophers and inscribed by Mersenne. Descartes presented for the first time in a classical piece of research the difference between the noetic and the material realms, as well as the problems arising from the interaction between these two. A problem that presents clearly the fact that noesis (understanding) doesn't leave enough space to free will. Descartes also seemed to support the idea of Dualism, which was the idea that, as he believed, a part of human understanding works outside human nature and doesn't follow the natural laws. That could more or less be explained, either because he was a strongly religious person, or just "cautious". Proving the first, Descartes believed that God should be accepted as people accept the certainty of a geometrical equation like for example that a triangle has three angles equal to two right angles. That, however, was an example that made no sense to many other intellectuals, including Pierre Gassendi who strongly opposed his view. Locke was a generation younger than Descartes, and had a completely opposite epistemological stand from that of Descartes. Locke's empiricism, believed in the knowledge gained via the human senses and insisted that Descartes' inborn meanings were not enough without the empirical data. The empiricist movement which had started after the *Novum Organum* written by Francis Bacon (1561-1705), and was formulated later on in Locke's apothegm, noted that: "There is no understanding in anything that hasn't been firstly bodied by senses". Opposite to his vie and direction was Berkley whose philosophy argued Lock's. He, in his turn has pushed philosophy a bit further, supporting the fact that Lock ought to investigate the term "tangible effects" he was given. The meta-Medieval period follows Spinoza. Spinoza believed in monism (*singularism*) and he had related morality (*this could have been another name for philosophy*) to Ephklides' geometry. For many, the key of Spinoza's monism translated as his disbelief in God and therefore one of the not so many atheists, but for others including the posterior philosopher Kirkegor, a strong supporter of God (Kenny, 1997). If someone had tried to picture the three philosophical eras: Ancient, Medieval and Modern he should have realized that philosophy has been dramatically transformed. During the first era, philosophy inelegantly had tried to give explanations for things that never had been discussed or investigated before. Those meanings had found either that the people were not yet prepared (too deep) or had been covered up by the scientific discoveries of the time. In the second period, dogmatism forced answers without leaving any space for investigation, but leaving behind questions that needed to be answered, and most importantly, facts to be verified. That led to the meta-Spinoza period and the modern philosophical era where the researches not only sought for answers but also, to elegantly verify those answers. It is commonly accepted that philosophy encaenia a new blueprint which conventionally is called modern philosophy. Strictly speaking modern philosophy owes its new "face" to Descartes, whose denial of an authentic foundation of knowledge and the prologue of

the critique methodology to the only way of reassurance any form of knowledgeable claim. The detail in the examination of a theory is very clear in Hume's research. Hume (1711-1776) was one of the first philosophers who supported that there are clear strategies for the researchers to follow putting himself with the group of inductivists, the research process that, years later Popper strongly criticized. His ideas however despite his methodology, concerning the types of memory and fantasy (*the real, the one someone remembers according to his empiricism and objectivism*) resulted in many future discussions.

Leaving the historical voyage of philosophy behind, it is important to provide a comprehensive account of the term epistemology. The major reason is that the two terms Epistemology and Philosophy have not only co-existed during the Medieval period, but until now the first term portrays in a great sense the extent of the researcher's philosophical stand. The term "epistemology" shows up for the first time in 1854 opposing the term "ontology". Ontology (*literally, the study of being*) is the "network of philosophical issues centering on the question of what kinds of things really exist and what kinds of things are only myths or illusions" (Kirham, 1992). As Dr. Toppen notes, "Ontological study concerns itself with the nature of the subject, while epistemology is the question of how we know what we think we know about that subject". The first was more than enough during the ancient period, since not many things were known. The latter on the other hand was when study and research actually matured enough. It was not enough to know about something but also if it is true and verifiable. Epistemology is concerned with the nature, sources and limits of knowledge and has been primarily concerned with propositional knowledge, that is, knowledge that such-and-such is true, rather than other forms of knowledge, for example, knowledge how to such-and-such. There is a vast array of views about propositional knowledge, but one virtually universal presupposition is that knowledge is true belief, but not mere true belief (Routledge Encyclopedia).

It is this point in the history of philosophy that epistemology attracts the biggest piece of the pie and becomes a study for research as a meaning and also an argument of how to approach epistemology in order to get closer to truth. Here however rises a new question: could the four theories of truth that follow, co-exist or are they completely different approaches? If yes, which one is the best to use? As McCloskey (1995) supports: "*we do not need to choose between them. Contrary to many writers including Maki, correspondence and coherence theory do not have to be "mutually consistent," any more than pepper and salt have to be mutually consistent. People use both theories in scientific argument daily. In particular, I do, and you do, and Maki does. Maki uses correspondence to extract true statements about my writing; and the notions he is able to extract will depend on coherence with what he already believes - for example, about epistemology. I use correspondence for measuring the rate of industrialization in Britain; and I use coherence to rule out Harberger triangles as a*

full explanation...” Thus, the question what are these theories and how can these help the quest for truth brings the modern philosophers (researchers) to look for answers.

6. THE MODERN... RESEARCH

The philosopher Ian Hacking (1983) has already confirmed Nietzsche's aphorism for historical lack of thought. They have transformed science into a mummy. When they remove the cloth from the body and they observe the left overs of a historical *modus operandi* they identify a rationality crisis. Twenty years earlier Gaston Bachelard (1980) had already rejected the picture of science that philosophers had built so far. Turning to the scientists he realized that their acts come from the same sources: the translations that they borrow from the philosophers when they leave their labs. The philosopher's "mummy" serves the social practices whether these are shown as paradigms or as deterrents. Kouzelis (1993) supports: *"Not only Philosophy but also the Sciences and especially the Social Sciences must clear the load of this coloured picture epistemology has..."* Epistemology - the field of controversy between the scientists and the philosophers- is an area of many positions, propositions and approximations. The way people understand epistemology is not clear since new questions arise even if they - philosophers and scientists - agree on one systematic natural approach to the sciences:

- What kind of approach will they give to epistemology; philosophical, scientific or a mixture?
- What is the terminus of this approach; the investigation of the evolution of sciences or the investigation of the evolution of the sciences in relation to the environment they exist in?
- What is the relationship of the approach taken with the history, psychology and theory of communication?
- Finally is epistemology the work of the scientists or is it the work of people outside science (philosophers, historians, sociologists)?

The target of modern philosophers to the entrenchment of the absolute truth resulted in the creation of the different strategies. As previously said, since humanity lives in the era of putting things into frameworks and patterns, it is not risky to say that it was placed the theory of truth into costumes. Similar to the Anglo-Saxons, the French called epistemology the philosophy of science, leading consequently as Kouzelis (1997) supports to a "Constitutive Coincidence": Epistemology = philosophy of sciences = positivist philosophy. The latter comes as a result of the coincidence of epistemology and philosophy. The rapid and continuous growth of sciences created – according to the Anglo-Saxons - the need for delimitation of scientific knowledge. It was the beginning of the three "epistemological" schools: the first one was that of the

Anglo-Saxons who set the foundation of the beginning of thematology, the creation of positivism. Opposing that was the French and the German schools, with the first to highlight the possibility of falsification and the latter the critique of rationalism. According to Kouzelis (1997), the three languages of epistemology were bridged for the first time - since the three epistemological theses, had no relationship or communication until then - in Vienna in the well known "*Vienna Circle*". Perhaps it was the beginning of the schism between those philosophers who adapted deductive methodology and those who followed the inductive approach. What is certainly though, is the fact that it was the beginning of labeling and forming the different theories into blocks (*another name for philosophy*) of truth. The most dominant are the: Correspondence theory, the Coherence theory, the Pragmatic theory and the Consensus theory. Every type of strategy and any point of view has its own index mark. It has in other words its philosophical supporter.

The first theory (Correspondence theory), which was strongly supported by Popper, maintains the philosophy that a theory is truth only if tested by empirical application and shown to be true but yet not verified. If not, then the researcher must start his quest for a new theory. Found in Wikipedia Encyclopedia the correspondence theory states that:

"Something (for example, a proposition or statement or sentence) is rendered true by the existence of a fact with corresponding elements and a similar structure. The theory maintains that the truth or falsity of a statement is determined only by how it relates to the world, and whether it accurately describes (i.e., corresponds with) that world. The theory presupposes an objective world and is therefore antagonistic to theories that problematise objectivity such as external world skepticism or metaphysical subjectivism".

Example: The statement "The opera Aida had its first performance in Cairo" is true just in case the opera Aida had its first performance in Cairo, and false otherwise. "Snow is white" is true just in case snow is white.

Problems: Is the correspondence theory itself true? If so, what does it correspond to? (Stanford Encyclopaedia of Philosophy)

Here the undoubted "Sir" of epistemology, Karl Popper, incarnated the debate between the two schools, the German and the Anglo-Saxon, bringing at the same time the victory in the field of the Anglo-Saxons as the major critique of rationalism. Many philosophers have gathered in this Vienna School since 1922, and the dogma of logical positivism had been developed and thoroughly discussed. Rudolf Carnap (Popper's greatest competitor), was the proponent of that position. Logical positivism supported that knowledge could be characterized as logical theories as long as it has been linked with the observation sentences which are correlated from the sensuous entrances (experiences). Popper's defense of science and rationality is better timed now than ever. In a period where rationalism and the true pursuit for knowledge suffers from people's disbelief and where relativism claims that it is impossible to

establish the primacy of science due to the lack of standards in rationality. The structure that Popper provided in which a code is rational if it is not logically contradictory and if it changes or is abandoned if proved to be false (falsification theory) provided the standards of rationality needed. In his theory Popper critiques the rationalists, saying that instead of trying to prove the truth behind a theory they should attempt to prove its faults. If proved then that theory must change, if not, the theory remains strong, for and as long as it does so, it is considered as ratified and as truth knowledge. The negative aspects of Poppers' theory as Psillos (2001) supports, was the fact that Popper had tried to eliminate the problem of induction. According to Dr. Psillos, science without induction can not exist and therefore Poppers' viewpoint that induction is a myth could not stand. What Dr. Psillos also supports is the fact that when a theory is considered to be ratified, no logic is to be considered as having any future influences, something that Popper should have been able to see. As Psillos also notes, in the case of two ratified positions, which one should be considered as the starting point? (That was the problem found that bothered Popper in his bibliography; the Practical Problem of Induction). The Falsification and the Ratification are both totalitarian procedures strongly supporting the "modus tollens" which claims that at least one part of the cluster is false. Consequently Poppers' empathy (identification) of epistemology with falsificationalism fails since it cannot provide a safe criterion of epistemology because of the fact that it is rare to find scientific parts falsifiable (Psillos, 2001). Going back to Tarski's theory for a while, he has found a solution to the correspondence theory slightly "fixing" philosophical vocabulary. Alfred Tarski's theory of truth has two components. First, he defines a true statement as a statement that corresponds to reality. This is only a definition of "true statement" and not of "truth" in general and second the second component to Tarski's theory is the idea that truth can only be defined relative to another language. Most languages include the word "true", but that leads to paradoxes like "I am lying" which is both true and false at the same time.

This opposition however by Dr. Psillos resembles the third theory, the Pragmatic theory. According to the pragmatists, beliefs are considered to be true if and only if, they are useful and can be practically applied to the real world. In other words if it can effectively and efficiently allow people to interact in the cosmos. A theory that has been widely supported by Lakatos also claims that: *Popper's distinction between the logic of falsifiability and its applied methodology does not in the end do full justice to the fact that all high-level theories grow and live despite the existence of anomalies (i.e. events/phenomena which are incompatible with the theories). The existence of such anomalies is not usually taken by the working scientist as an indication that the theory in question is false; on the contrary, she/he will usually, and necessarily, assume that the auxiliary hypotheses which are associated with the theory can be modified to incorporate, and explain, existing anomalies* (Darwin, 2006).

Example: My belief that inanimate objects do not spontaneously get up and move about is true because it makes my world more predictable and thus easier to live in. It "works."

Problems: Sometimes unreasonable beliefs "work". A tribe might believe that human sacrifice brings their crops back each year. The crops do come back after the human sacrifice, but not because of the human sacrifice (Stanford Encyclopaedia of Philosophy).

The second most leading theory and the major opponent of the Correspondence Theory is the Coherence Theory. According to the Coherence Theory of truth, a statement is true if it is logically consistent with other beliefs that are held to be true. A belief is false if it is inconsistent with (contradicts) other beliefs that are held to be true. We should doubt claims that are currently inconsistent with the rest of our beliefs. Willard Quine is a famous contemporary philosopher who advocates the Coherence Theory, but its great supporter was actually Paul Feyerabend. His critique on "logos" (language) into two ideas, the one of Language and the second as objectivity made many of the recent philosophers reevaluate their epistemological positions (Bourlakis, 1987).

Example: We don't believe in solipsism primarily because it contradicts so many of our other beliefs or the truth of a statement about black holes it cannot be verified (because we can't travel into a black hole and not even close to one) and therefore it only depends on whether it is coherent with the other "truths" of Cosmology.

Problems: A belief can be consistent with all our other beliefs and yet have no independent supporting evidence. For example, many metaphysical beliefs are consistent with all imaginable states of affairs (e.g., "the universe came into existence five minutes ago complete with historical records and memories") (Stanford Encyclopaedia of Philosophy).

The last but not least theory of truth is the Consensus Theory vigorously demonstrated by Kuhn who noted: *"Normal science" means research firmly based upon one or more past scientific achievements, achievements that some particular scientific community acknowledges for a time as supplying the foundation for its further practice*. *These achievements can be called paradigms. People whose research is based on shared paradigms are committed to the same rules and standards for scientific practice*". In other words truth is the mutual agreement between what people believe.

7. POLITICAL PHILOSOPHY, WHAT LIES BENEATH THE TRUTH?

"People continuously claim over and over that, philosophy does not really make any progress that people still deal with the same philosophical problems which problematised the Greeks. Those who say that though, do not understand why it has to be this way. The reason is, because language has stayed behind the same and stays on

to delude people, while it makes them ask the same questions” *Wittgenstein (Civilization and Principles)*. During this philosophical trip many meanings and theories has been discussed, others comprehensively and others briefly. The innovation of modern philosophy is not to regurgitate theories regarding truth as Wittgenstein supports. If that was the case then nobody should discuss modern philosophy. The meta-language Popper (1960) suggests is divided semantically and syntactically. This helps the researchers to understand the different forms it can play and also how language can be manipulated. Ideally it has been transformed, matured, simplified or even for many straight-jacketed. Whether the researcher uses one strategy or the other in search of truth or whether he/she sees truth rationally or pragmatically or even as a continuous critique, they all agree that truth is difficult to understand. The reasons are many: The principal reason is language, also the different epistemological positions of the philosophers, their ontological being and self-interests. As again Popper supports (1960) the people who do not accept Tarski’s objective truth are the ones, who firstly are discouraged by the combination of a simple idea that faces a complicated solution secondly dogmatism engrains them that this is the only correct truth. This however requires lot of discussion. Small countries or civilizations without a strong history have to maintain the dogmatism many times in the form of a “Dream”. Truth is inapproachable but there are areas where even the most post modernists will have to accept truth as a staring point of any critique they intend to do and that could be science. *“Therefore truth is not an entity that researchers do (or can) study...it is to postulate as an entity fallaciously”* (Levin, 1991). But if this is the case and truth not only is unreachable but also is seen with cautiousness what happens in the case where self-interests, ontological patriotism and epistemological ego are added? How can truth be a quest and what theories or strategies can be brought up in order to achieve at least a common agreement? Political philosophy is the study of how people can and ought to live together. Amongst the problems considered by political philosophy are the questions of nature and the claims of justice, the claims of liberty and property etc. Anthony Quinton (Kenny, 1997) supports that phrases such as “political philosophy or political theory” or even “political thought” have the same meaning and could be used for the same purposes. What should not be misinterpreted are the terms “political philosophy” and “political science”. The latter is only a study of the mechanical and political estates of the country. On the other hand political philosophy is the parade of general and systematical theories that constitute a constant consolidate tradition. What will be discussed in this situation is the tradition of the Greek Cypriots and the tradition of the Turkish Cypriots. This tradition is affected by a set of components, like for instance human nature, the comments regarding the political facts, the society, and the country’s case on the subject of its right to protect its people’s political rights. It was based on these components that in 1974 Turkish troops marched into Cyprus.

Probably it was for the sake of this tradition that it is the only island in the world that it is still divided and under military occupation.

The question however that needs to be discussed is, for how long will Cyprus be divided and what lies beneath the truth that makes it so difficult not only to quest, but even to begin with the quest of truth. Shouldn't there have been a starting point? Again here the basic problem is language. The political language as used by the politicians does not seek for the truth at all. As Pinter (2006) supports their interest is the hunger to maintain power even if that is translated into keeping people in complete darkness. This darkness could be achieved either by hiding the facts, or by persistently feeding hate and nationalism. Without these two points a mutual agreement of what is true and what not could be achieved. Nevertheless in the case of the Cyprus problem, who will eventually agree to be burdened with the political cost? The two truths, between the Turkish and Greek Cypriots – which could definitely be more than two - many claim are manipulated and supported not only from the epistemological background of the opposite parts but also their ontological '*Sein*' as Heidegger describes (Xiropaides, 1995) - the positions, in other words, the two sides take in the matter. But here a new question arises: can the notions of truth and truthfulness of the matter, be intellectually stabilized, in such a way that what the two sides' understanding is in regards of a "common" truth, and their chances of meeting it, covers both their needs and also the others need for truthfulness? Or is Truth another diplomatic phrase that serves peoples interests? Williams (2004) supports that this is the problem of present-day philosophy and that there are many different motives for telling the truth. These motives must be characterized by a notion of trust and sincerity (Williams, 2004) or maybe Tarski's objective truth where all parts will be in agreement of the same truth to solve the problem. Trust as supported by Hunt (2005), Morgan and Hunt (1994) and Pearce (2001) is based on the mutual agreement based on reliability and integrity on a matter; in this case truth (the facts of 1974). At this point let's put some points in perspective. Trust should not be confused as a pure paradigm of truth. That could be a fatal misinterpretation. What must be seen though, is an important precondition that even the most fanatic postmodernists should accept. Without trust, as many researchers including myself uphold, the hunt of truth can't begin. The ontology of human nature is to seek answers. The Greek word "*Anthropos*" (Man) which derives from the ancient Greek words '*Ano*' and '*Throsko*' (I look up) literally means what humanity really does, seek answers and not as has been paradoxically used for ecclesiastics to look up to God. It's an undeniable phenomenon/need where dogmatism and fanaticism must be eliminated. Truth and knowledge for both the Greeks and Turks will bring development and prosperity. Trust – a feeling that because of many variables: religion, territorial expansion, resource possession, leaders personal interests (the virus of power) - never seemed to be a sharing feeling for the two countries. This could be their compass.

8. CONCLUSION

“There will be no end to the troubles of states, or of humanity itself, till philosophers become kings in this world, or till those we now call kings and rulers really and truly become philosophers, and political power and philosophy thus come into the same hands”.

Plato

NOTES

1. Churches nowadays.
2. Ancient Greece was divided into city-states, each of which was an individual country.
3. Citizen of Athens.
4. The Dark Person. Here it takes the meaning of somebody whose sayings and thoughts are difficult to follow.
5. Lyceum until today is lower than University. At that time it was because the Athenians disliked Aristotle, his methods and eccentricities.
6. http://en.wikipedia.org/wiki/Aristotle#Aristotle.27s_epistemology

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PCR WITH THE E6/E7 PRIMER SETS IMPROVES DETECTION OF HUMAN PAPILLOMAVIRUS TYPE 16 DNA IN CERVICAL SAMPLES

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ABSTRACT

Currently the most sensitive methods for detection of HPV DNA are amplification-based methods, mainly PCR, and the most widely used PCR protocols employ primers directed to the L1 gene. At the same time, integration of viral DNA into host cell DNA results in loss of L1 gene while E6 and E7 genes are retained. The present study investigates the efficiency of E6/E7-gene directed PCR for detection of HPV16. Of 43 specimens, which produced repeatedly HPV negative results in our previous study by PCR directed at L1 gene, 5 tested HPV16 DNA positive when reanalyzed by PCR with E6/7-1 and E6/E7-2 primer sets. Four of these HPV16 E6/7-positive specimens were obtained from women with cervical dysplasia and one from a cytologically normal woman. Further we found that HPV16 E6/7-1 primer is more efficient than HPV16 E6/7-2 in simultaneous amplification with L1 primer pair in a multiplex HPV16 PCR. Our results indicate that the use of E6 /E7 gene primers improves HPV16 detection by PCR and reduces "false negative" results in early stages of carcinogenesis.

Keywords: Human Papillomaviruses; Cervical Cancer; HPV DNA Detection and Typing; PCR; HPV Type 16; E6/7 Gene Primers.

1. INTRODUCTION

Specific types of human papillomaviruses (HPVs), so-called high-risk (HR) HPVs, namely types 16, 18, 31, 33, and 45 as well as other less frequent types have been implicated in the etiology of cervical cancer. Worldwide at least 99% of the cervical carcinomas are HPV DNA positive (Bosch et al., 1995 and 2002; Walboomers et al., 1999) and HPV type 16 is the most commonly detected type (Munoz, 2000).

HPV testing and identification of HR HPV types has an important prognostic or therapeutic value. Identification of HR HPV types in cervical scrapes could help to identify patients with increased risk for development of cervical cancer or in the clinical management of women with cervical lesions (Nobbenhuis et al., 1999;

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Solomon et al., 2001). The reliable and accurate evaluation of type specific HPV infections using highly sensitive and specific HPV testing methods will reduce the potential of “false negative” results due to missing a HR HPV type. Currently the most sensitive methods for detection of HPV DNA are amplification-based methods, mainly PCR. The sensitivity and specificity of PCR-based methods can vary, depending mainly of the primer set, the size of the PCR product, reactions conditions. A number of PCR-based methods for the HPV DNA detection and typing have been described and the most widely used protocols employ primers directed to the L1 gene (Manos et al., 1989; Van den Brule et al., 1990; De Roda Husman et al., 1995; Jacobs et al., 1997; Gravitt et al., 2000). In some cases, however, the disruption of the L1 gene, following virus integration causes the absence of the L1 gene sequences in the PCR product and “false negative” results. At the same time E6 and E7 genes are retained after infection and HPV PCR strategies directed at the E6/7 region may be preferable to L1 (Morris, 2005, p. 1171). In addition, according to many authors, the overall prevalence of HPV DNA in any given collection of clinical materials is underestimated if only a single detection method or a single PCR primer set is used.

To address these issues and to study primer efficiency in detecting most prevalent and oncogenic HPV type, the HPV16 (Clifford et al., 2005), we reanalyzed by PCR using E6/E7 HPV16 primers formerly HPV-negative cases. In addition, we tested the efficiencies of the HPV16-specific primers in a multiplex PCR.

2. MATERIAL AND METHODS

2.1. Preparation and selection of samples

Cervical specimens were taken with a cytobrush from the endocervix and the ectocervical surface for a Pap test and HPV PCR assay as part of an ongoing study on the prevalence of HPV among women in Bulgaria conducted by the Bulgarian Academy of Sciences, SBALO National Oncology Center Sofia and Sofia Dermatovenereological Dispensary. One slide was prepared for a routine cytological diagnosis and the same brush was thereafter immersed in 1,5ml 0,9% NaCl. The samples were vigorously stirred, centrifuged, resuspended in 500 µl of detergent buffer (10 mM Tris-HCl (pH 8,3), 50 mM KCl, 2,5 mM MgCl₂, 0,45% Triton X100, 0,45% Tween 20) and digested with 100µg/ml proteinase K for 2 h at 56°C (Steinke et al., 1995). The proteinase was inactivated by incubation at 95°C for 10 minutes and 10µl of processed sample was used in each PCR assay. In our previous study all samples were tested with both PCR using L1 consensus primers MY09/MY11 and with PCR using type-specific primers for the HPV16 L1 gene, HPV18 L1 gene, HPV31 E1/E2 gene, and HPV33 E1/E2 gene as previously described (Manos et al., 1989; Van den Brule et al., 1990; Steinke et al., 1995). HPV DNA-negative samples

were selected for the present study. In addition, the HPV16 positive samples were used as templates to test the efficiency of HPV E6/7 and L1 primers in multiplex PCR.

2.2. PCR procedures

All oligonucleotide primers were synthesized by LKB Vertriebs GmbH. The primers used in the present study were the HPV16 E6/7-1 (Baay et al., 1996), HPV16 E6/7-2 - primer pair spanning longer DNA sequences than E6/7-1, and HPV16 L1 primers (Van den Brule et al., 1990) (Table 1). All specimens were also amplified with β -globin primers PC04 and GH20. CaSki cell DNA (HPV16 positive) was used as positive control. We used HPV16 E6/E7-1, E6/E7-2, and L1 primers for amplification in HeLa cell DNA (HPV18 positive) as a negative control and to verify the specificity of these primers.

The final 50 μ l PCR mixture contained a 10- μ l sample, 25 μ l PCR Master Mix (Promega), 3 mM MgCl₂, 20 pmol of each primer. Amplifications were performed with the following cycling profile: incubation at 94°C for 5 min followed by 40 cycles of 1-min denaturation at 95°C, 1-min annealing at 55°C, and 1-min elongation at 72°C. The last cycle was followed by a final extension step of 10 min at 72°C. Multiplex PCR were performed with the QIAGEN multiplex PCR kit according to the instructions of the manufacturer. PCR products were electrophoresed on a 2% agarose gel and stained with ethidium bromide. The UV-illuminated gels were photographed.

3. RESULTS AND DISCUSSION

43 cervical scrapings, which produced repeatedly negative results in our previous study both by the MY09/MY11 HPV PCR and by four type-specific PCRs (HPV 16, 18, 31 and 33) directed at L1 or E1/E2 genes, were included in the present study. They were additionally tested with two other primer sets for HPV16 E6/E7 open reading frames. The primer sequences used in our study are shown in Table 1. All 43 HPV negative samples showed successful amplification of β -globin sequences by using primer combination PC04/GH20.

Each sample was tested with E6/7-1, E6/7-2 and L1 HPV16 primer pairs. We included L1 primers in these assays as previous PCR-based investigations to detect HPV16 have employed L1 primers. Of 43 specimens, 5 tested HPV16 DNA positive by PCR with E6/7-1 and E6/E7-2 primer sets. Four of these HPV16 E6/7-positive specimens were obtained from women with cervical dysplasia and one from cytologically normal woman. Fragments of 96bp and 390bp were successfully amplified with E6/E7-1 and E6/E7-2 primers, respectively (Figure 1). At the same time the specimens were negative by the L1 HPV16 primers as was found in our previous study. There was no amplification of HeLa DNA with HPV16 primers used in this study.

TABLE 1: HPV 16 TYPE-SPECIFIC PRIMERS USED IN THIS STUDY

Primers	Sequence (5'-3')	Amplicon (bp)
L1	TGC TAG TGC TTA TGC AGC AA ATT TAC TGC AAC ATT GGT AC	150bp
E6/E7-1	GGT CGG TGG ACC GGT CGA TG GCA ATG TAG GTG TAT CTC CA	96bp
E6/E7-2	TTG CTT TTC GGG ATT TAT GC AGA TCA GTT GTC TCT GGT TGC A	390bp

There are data indicating that the combination of E7 and L1 primers provides the maximum sensitivity of HPV PCR assays (Tate et al., 1996). Therefore, we next tested the possibility for an efficient simultaneous amplification of HPV16 E6/E7 and L1 gene fragments using E6/7-1, E6/7-2 and L1 primer pairs (TABLE 1). All primers were mixed, and multiplex PCR was performed using as the template DNA from samples found in our previous studies HPV16 positive by PCR with primers directed to the L1 gene. The results of our multiplex HPV16 PCR reaction are seen in FIGURE 2: the specific bands of 390bp, 150bp and 96bp are results of simultaneous amplification with E6/7-2, L1 and E6/7-1 primer sets respectively. The E6/7-1 and L1 primers yielded stronger PCR products (more intense bands) than E6/7-2 primer. This indicated that HPV16 E6/7-1 is more efficient than HPV16 E6/7-2 in simultaneous amplification with L1.

Our results showed that five cervical scrapings obtained mainly from women with cervical dysplasia and negative for HPV by L1 gene PCR, when reanalyzed with E6/E7 HPV16 primers, tested positive which indicated that PCR amplification with E6/E7 primers is more efficient in detecting HPV16 than PCR with L1 primers.

FIGURE 1: HPV16 DETECTION BY PCR: 1. – MOLECULAR WEIGHT MARKER (100 bp MWM); 2. - PCR WITH E6/E7-2 PRIMER; 3. - PCR WITH E6/E7-1 PRIMER; 4. - PCR WITH L1 PRIMER

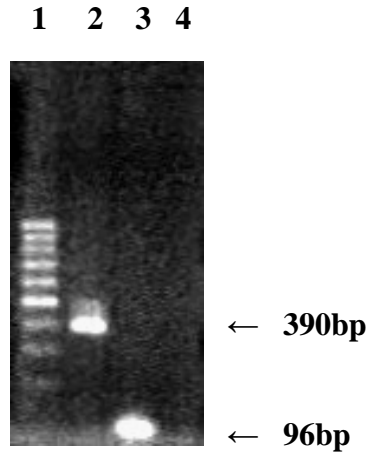
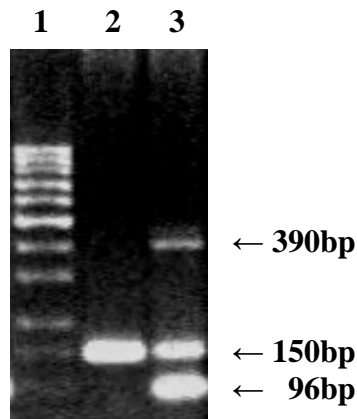


FIGURE 2: HPV16 DETECTION BY MULTIPLEX PCR: 1 MOLECULAR WEIGHT MARKER (100 bp MWM); 2 - DNA, POSITIVE FOR HPV16 BY PCR WITH L1 PRIMERS, USED AS TEMPLATE IN MULTIPLEX PCR; 3- MULTIPLEX PCR WITH E6/E7-1, E6/E7-2, AND L1 HPV16 TYPE-SPECIFIC PRIMERS



These results may imply the possibility of viral gene integration at early stages of carcinogenesis, which causes the loss of the L1 gene, while E6 and E7 gene retained.

An increase in HPV DNA detection based on the HPV16 E6/E7 gene detection system was found in cervical cancer specimens by other authors (Huang et al., 2004; Karlsen et al., 1996; Iwasawa et al., 1996). In other studies the presence of L1 gene PCR products was reported to be found only in 60% (Kado et al., 2001) and 66.6% (Lukaszuk et al., 2003) of the HPV E6 gene detection system. In all these reports the difference in the rate of HPV detection by the L1 and E6/7 primers was related to L1 gene loss after virus integration into host cell DNA in cervical cancer cases (Zur Hausen H., 1996). In addition, in esophageal carcinoma as well HPV L1 gene detection rate was found much lower than that of E6 and E7 gene: sixty-three HPV L1 negative samples have been detected harboring HPV-16 (detected by E6 primers of HPV16) (Li et al., 2001).

In conclusion, the use of E6 /E7 HPV16 primers improves HPV detection by PCR in early stages of carcinogenesis and reduces “false negative” results. The combination of L1 and E6/7-1 primers provides the maximum sensitivity of HPV PCR assays and the multiplex HPV16 PCR with these primers could be a simple method for detecting all patients harboring HPV/HPV16.

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REACTOR DOSIMETRY IN BULGARIA FOR JUSTIFICATION OF NPP'S REACTOR PRESSURE VESSELS SAFETY

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ABSTRACT

The reactor pressure vessel dosimetry has been developed since 1986 by INRNE of BAS, and later by the Faculty of Physics of the Sofia University "St. Kl. Ohridski", as well as by Kozloduy NPP with main purpose to support the Kozloduy NPP in assessment of the current state and the rest lifetime of the RPVs of the four reactor units of type VVER-440/230 and two reactor units of later generation type VVER-1000/320. These data are requested for NPP safety justification and substantiation of NPP lifetime prolongation. The neutron fluence determination methodology based on three-dimensional neutron transport calculation with multi-group energy dependence approximation by discrete ordinates code TORT with problem oriented neutron cross section library BGL or BUGLE96, and without approximation of energy dependence by Monte Carlo code MCNP with neutron cross section library DLC200, has been developed. This methodology was verified and improved continuously up to now following the development of the computer technique and recent worldwide experience in reactor dosimetry. The RPV fluence data are verified/ validated by measurements of the induced activity of threshold foil-detectors placed in the air cavity behind the RPV. The verification and adjustment of the fluence on surveillance specimens is performed by measured activity of detectors from the surveillance containers and Mn-54 activity of the specimens themselves.

Keywords: Neutron Fluence; Radiation Embrittlement; Radiation Damage; Reactor Vessel.

1. INTRODUCTION

Kozloduy Nuclear Power Plant is the biggest power plant on the Balkan Peninsula. It is located at the Bulgarian north boundary with Romania, on Danube river-bank. About half of the electricity power in the country is produced by the Kozloduy NPP. There are four reactor units of type VVER-440/230 (Units 1 to 4) and two reactor units of later generation type VVER-1000/320 (Units 5 and 6) in Kozloduy NPP. The first unit (Unit 1) has been put into operation in 1974. The Units 1-2 were shut down in 2000 and the Units 3-4 - at the end of 2006 by political reasons.

The reactor pressure vessel (RPV) dosimetry has been developed since 1986 by the Institute for Nuclear Research and Nuclear Energy (INRNE) of the Bulgarian Academy of Science with main purpose to support the Kozloduy NPP in the assessment of the current state and rest lifetime of the RPVs in accordance with the

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Supplier rules (PNAE G-7-002-86, PNAE G-7-008-89, 1989). The RPV neutron fluence data are requested for NPP safety justification and substantiation of NPP lifetime prolongation.

The RPV dosimetry has been developed partially by the Faculty of Physics of the Sofia University “St. Kl. Ohridski” since 1999 to study the surveillance specimens. The VVER-1000 RPV fluence evaluation has been carried out by the Kozloduy NPP physicists since 2000.

2. NEUTRON FLUENCE DETERMINATION METHODOLOGY

2.1. Calculations

The neutron flux and its responses on the RPV and in the adjacent zones of VVER are obtained as a solution of the kinetic equation of neutron transport. Due to the complexity of neutron production and transport, from the core to the RPV the task is separated into two parts. The first part – criticality calculation (eigenvalue problem), describes how the chain reaction is maintained in the reactor core and is used for determination of the fission neutrons that are born in the reactor core. These neutrons are considered as a fixed source for the second part of the task that describes the neutrons transport outside of the core area. This approach is applied worldwide and is appropriate for neutron fluence and induced activity calculation (Ilieva et al., 1996).

The relative power determination and the fuel burnup distribution in the core in accordance with the operational history is carried out using the 3D diffusion codes PYTHIA/DERAB (Thomas, 1996) for VVER-440 and TRAPEZ (Schulz, 1997) for VVER-1000. The effective cross-sections libraries for the diffusion calculations are generated by the lattice cell code NESSEL (Schulz, 1994).

Nowadays the neutron fluence determination methodology of INRNE (Fig. 1) is based on three-dimensional neutron transport calculation by discrete ordinates code TORT (Rhoades and Childs, 1987) with multigroup energy dependence approximation using neutron cross section library BGL (Bucholz et al., 1996), and without approximation of energy dependence by Monte Carlo code MCNP (Briesmeister, 2000) using neutron cross section library DLC200 (Briesmeister, 2000). The problem oriented BGL library has been specially created for VVER-1000 and VVER-440 types of reactors. The fixed source needed for discrete ordinate calculation is prepared by the code package DOSRC (Belousov et al., 2001) created especially for this purpose. Besides the source preparation the package provides the fixed source and calculation geometry model visualization (Fig. 2) that makes it very useful for calculation geometry modeling and QA purposes application.

The TORT code with BUGLE96 neutron cross section library (White et al., BUGLE-96) has been used by the Faculty of Physics of the Sofia University “St. Kl.

Ohridski” for study of surveillance specimens, and by the Kozloduy NPP for RPV fluence evaluation of Units 5 and 6.

The evaluation of neutron fluence has been used to determine the current state of RPV metal embrittlement and correspondingly RPV residual lifetime as well as to select the fuel loading scheme that warrants the RPV neutron fluence rate reduction and consequent RPV lifetime extension. That is why the RPV neutron fluence evaluation is required for NPP safety justification and substantiation of management decisions, for instance about lifetime prolongation.

The nondestructive method for the evaluation of metal embrittlement under neutron irradiation is based on the relation between the neutron irradiation embrittlement temperature shift ΔT_F , $^{\circ}\text{C}$, and the fluence F , cm^{-2} , of neutrons with energy above 0.5 MeV. The Russian standard (PNAE G-7-002-86, PNAE G-7-008-89, 1989) for VVER reactors demands the usage of the next relation for such evaluation:

$$\Delta T_F = A_F (F/F_0)^{1/3},$$

Where, A_F , $^{\circ}\text{C}$, is a chemical coefficient of neutron embrittlement; and $F_0 = 10^{18}$, cm^{-2} .

FIGURE 1: FLOWCHART OF THE SOFTWARE PACKAGE FOR NEUTRON FLUENCE CALCULATION¹

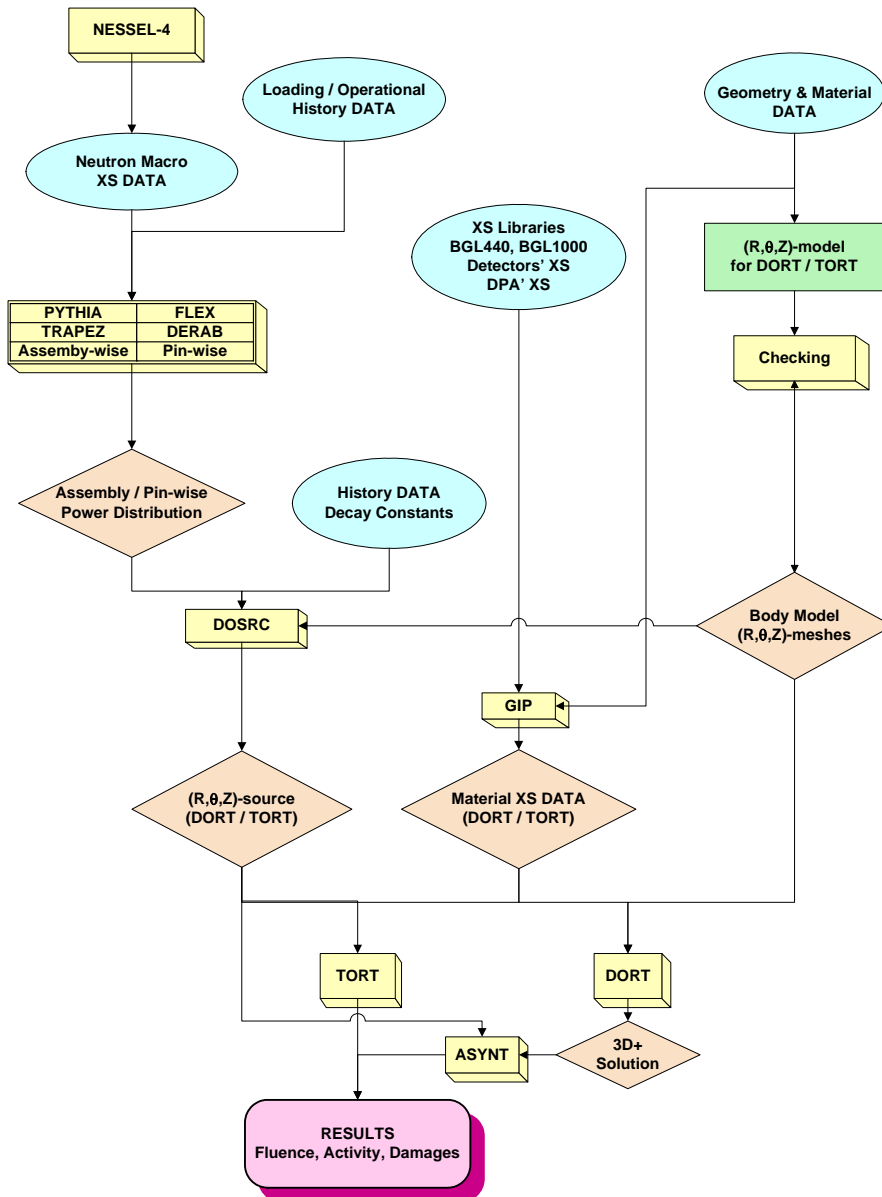
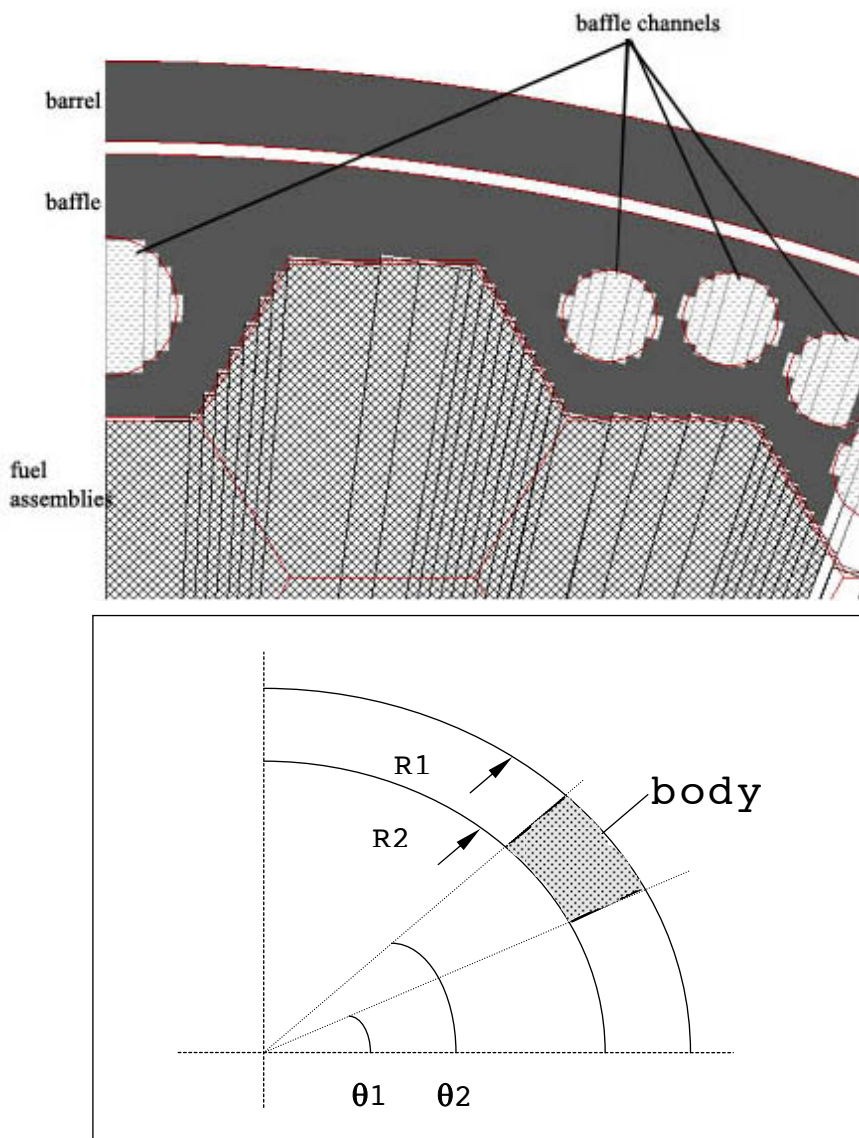


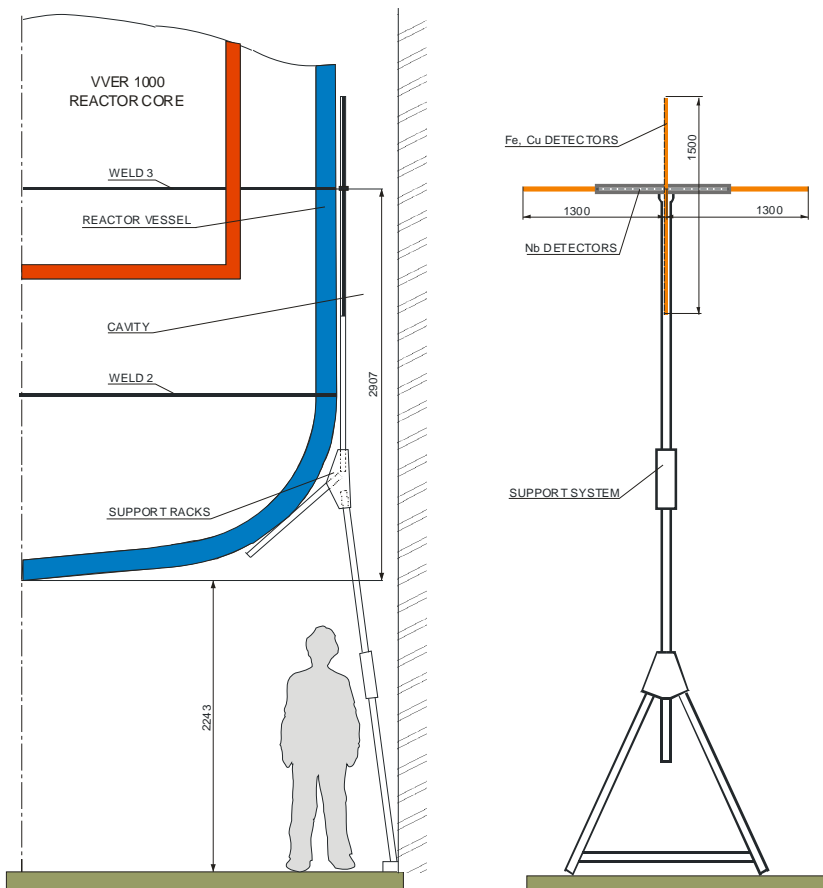
FIGURE 2: GEOMETRY MODELING OF THE VVER-1000 REACTOR SYSTEM



2.2. Measurements

The calculation reliability of neutron fluence is limited by the uncertainties of the data (nuclear and structural) used in the neutron transport calculations. That is why it is always advisable to compare calculational with measured quantities. Since the neutron flux is not a directly measurable quantity, the flux related quantity such as the radioactivity of an isotope generated by the neutron irradiation is compared.

FIGURE 3: DEVICE FOR IRRADIATION OF DETECTORS IN THE AIR CAVITY BEHIND THE VVER-1000 RPV

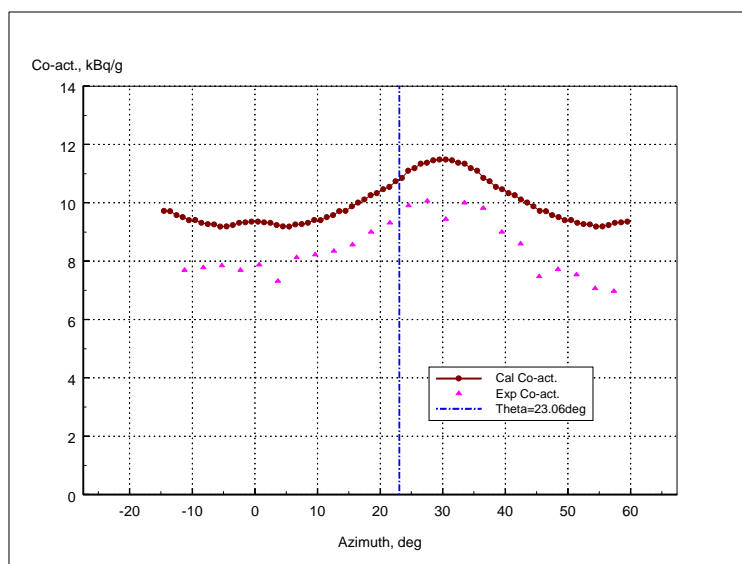


The RPV Fluence data is verified/ validated by measurements of the induced activity of threshold foil-detectors placed in the air cavity behind the RPV. A racks'

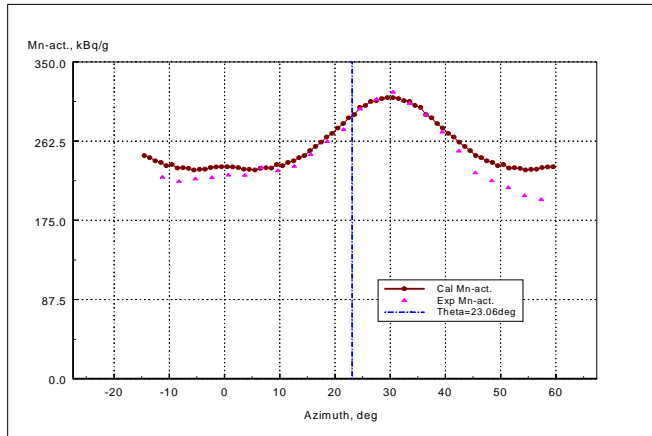
device with iron, niobium and copper wire/foil detectors is disposed in the air cavity behind the vessel (Fig. 3). The horizontal wire/foil detectors comprise a 60 degrees azimuth sector, and the vertical ones are situated axially along the core height (Ilieva et al., 1996). For illustration, the comparison of measured and calculated activity results for cycles 15 and 16 of Kozloduy NPP Unit 4 are presented in the Fig. 4-6. The calculated activity of ^{54}Mn (Fig. 4) are in a good consistency with the measured one. The calculated ^{60}Co and $^{93\text{m}}\text{Nb}$ activity data overestimate the measured ones: the mean overestimation is 18% and 17%, correspondingly. The reasons for this deviation have to be additionally investigated.

The verification and adjustment of the fluence on surveillance specimens is performed by measured activity of detectors from the surveillance containers and Mn-54 activity of the specimens themselves.

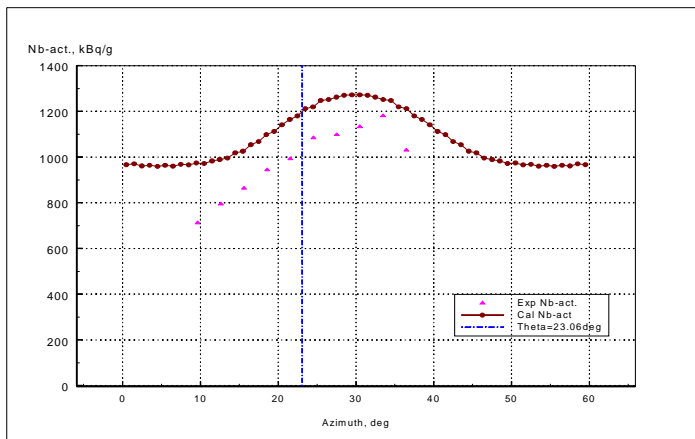
FIGURE 4: DISTRIBUTION OF THE ACTIVITY FROM THE REACTION ^{63}Cu (N,α) ^{60}Co ON AZIMUTH DIRECTION, CYCLE 8, UNIT 6



**FIGURE 5: DISTRIBUTION OF THE ACTIVITY FROM THE REACTION 54FE
(N, P) 54MN ON AZIMUTH DIRECTION,
CYCLES 15-16, UNIT 4**



**FIGURE 6: DISTRIBUTION OF THE ACTIVITY FROM THE REACTION ^{93}Nb
(N, N') ^{93}M NB ON AZIMUTH DIRECTION,
15&16 CYCLES, UNIT 4**



3. HISTORY

3.1. Calculation methodology

The calculation methodology for neutron fluence determination firstly applied has been based on the two-dimensional model and application of DORT code (Rhoades W. A. and Childs R. L., 1988) with neutron cross-section libraries FLUNG (Santoro et al., 1981) and L26P3S34 (Voykov et al., 1982). The geometry model has been substituted by three-dimensional just a little later by synthesis method application (Ilieva et al., 1994).

Input data sensitivity analyses for optimal choice of spatial coordinate meshes, order of discrete ordinate quadrature set S_n , polynomial neutron scattering anisotropy approximation P_n , convergence constant value, and neutron constants library has been carried out to reduce the calculation method uncertainties up to acceptable level at a reasonable cost (Ilieva et al., 1994; Belousov and Ilieva, 1997; Ilieva et al., 1996; and Belousov et al., 1998).

Adjoint synthesis method ASYNT (Belousov and Ilieva, 1997) has been developed by us for the solution of the tasks with one and the same geometry and material description but with different neutron source distribution. In this case the time consuming transport calculation has been carried out just once for every response in order to obtain the task adjoint solution. The evaluation of flux/responses values of every source distribution is reduced to the space and energy integration. The integrant is a product of three-dimensional adjoint solution and the current source, determined by loading patterns and operational regimes realized. The three-dimensional adjoint solution is synthesized using two- and one-dimensional solutions of the adjoint neutron transport equation. In comparison with the forward synthesis the ASYNT uses fewer approximations and allow us to substantiate strictly the application of synthesis approach.

The implementation of the three dimensional TORT code is dated in 1994 but its use for routine calculations has been realized later when more developed and improved computers became available. The MCNP code application started in 1999 for calculation of VVER-1000 and VVER-440 benchmark tasks developed at the Czech critical assembly LR0 within the international projects of IAEA and EC (Osmerna et al., 2001; Ballesteros et al., 2004).

3.2. Measurements and calculations for Kozloduy NPP

Activities connected with RPV fluence calculation and embrittlement temperature shift ΔT_F evaluation started in 1986. Nowadays there are more than 30 reports regarding the fluence evaluation on RPVs of Units 1-6. Ex-vessel detectors have been installed and irradiated in the air cavity behind the vessel from 1993 up to now.

During that period more than 22 measurements of irradiated sets of detectors have been carried out and used for fluence calculation validation.

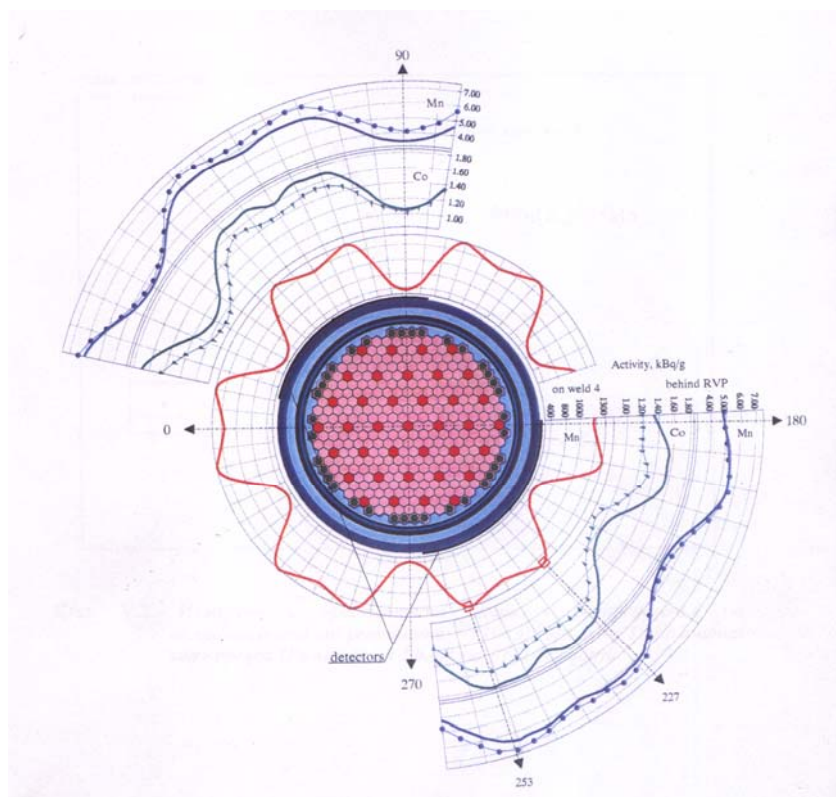
Templates from the inner wall of the Unit 2 RPV (1992) and scraps (1995) and templates (1996) from the inner wall of the Unit 1 RPV for embrittlement study were taken out. The calculated and measured ^{54}Mn , ^{60}Co and $^{93\text{m}}\text{Nb}$ activity values of the detectors irradiated in the air cavity behind the RPV, and ^{54}Mn activity of the scraps from RPV inner wall of Unit 1, after the 18th cycle, are presented in Fig. 7. The measured ^{54}Mn activity values of the scraps are in a good consistency (within 9%) with the calculated ones (Apostolov et al., 1998).

Assessment of neutron fluence distribution over the surveillance samples has been carried out. For this purpose calculation and measurement of the induced activity of the detectors and metal specimens from surveillance sets 1L (1997) (Belousov et al., 1998), 2L (1998) (Ilieva et al., 2001) of Kozloduy NPP Unit 5, and 1L of Unit 6 (2001) have been performed. It has been found that the discrepancy between experimental and calculational fluence did not exceed 30%. It seems that this discrepancy could not be decreased significantly due to the impossibility to determine more precisely the geometry position and orientation of the surveillance assemblies during the neutron exposure in the conditions of strong neutron field gradient.

The safety limits of the support structure of Units 1-4 have been revised in the frame of the contract.

For this purpose the neutron fluence on the support structure of Kozloduy NPP Unit 4 for the period of operation as well as for the whole project has been evaluated (Fig. 8) in the frame of the Framatome ANP GmbH Contract "Evaluation of the RLT of Units 1-4 of NPP Kozloduy" (Ilieva et al., 2005).

FIGURE 7: CALCULATED (LINES WITHOUT SYMBOLS) AND MEASURED (SYMBOLS) INDUCED ACTIVITIES OF THE SCRAPS AND EX-VESSEL DETECTORS OF KOZLODUY NPP UNIT 1, AFTER 18TH CYCLE



Verification of the fluence data has been done by measurements of the induced activity of detectors irradiated during one cycle at the positions (Fig. 9) close to the most critical places of the support structure. The comparison of calculated and measured results has shown that the neutron fluence evaluation in the area of the support structure is conservative with uncertainty that does not exceed 15% (Fig. 10-11). The obtained result has been a base for proving that the support structure of the VVER-440 reactor vessels is not a Units' lifetime limiting component.

FIGURE 8: DISTRIBUTION OF THE NEUTRON FLUX IN THE AREA OF KOZLODUY NPP UNIT 4 SUPPORT STRUCTURE, NORMALIZED TO THE FLUX VALUE AT POINT 1

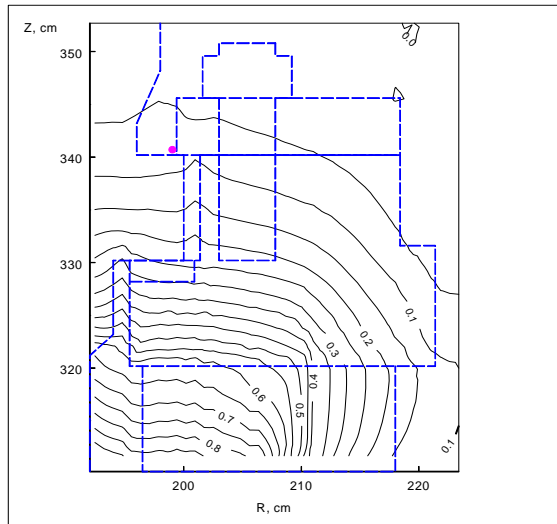


FIGURE 9: DETECTORS' POSITIONS IN THE AREA OF RPV SUPPORT STRUCTURE OF KOZLODUY NPP UNIT 4

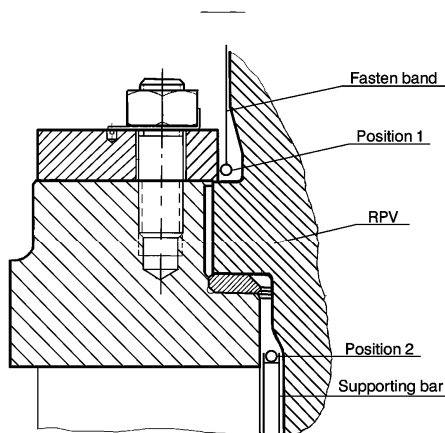


FIGURE 10: AXIAL DISTRIBUTION OF THE ACTIVITY FROM THE REACTION $^{54}\text{Fe}(\text{N}, \text{p})^{54}\text{Mn}$ UNDER THE SUPPORT STRUCTURE, POS.2, CYCLE 17, UNIT 4

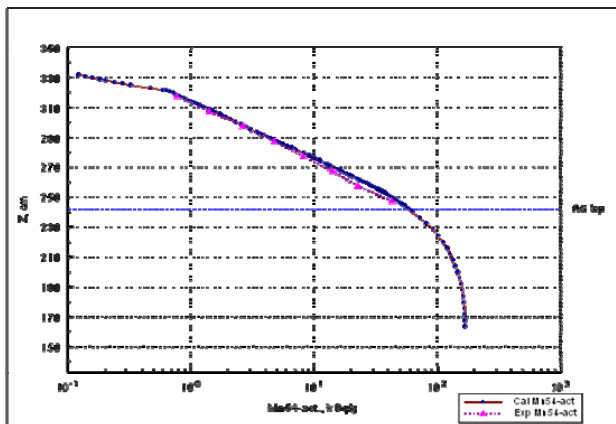
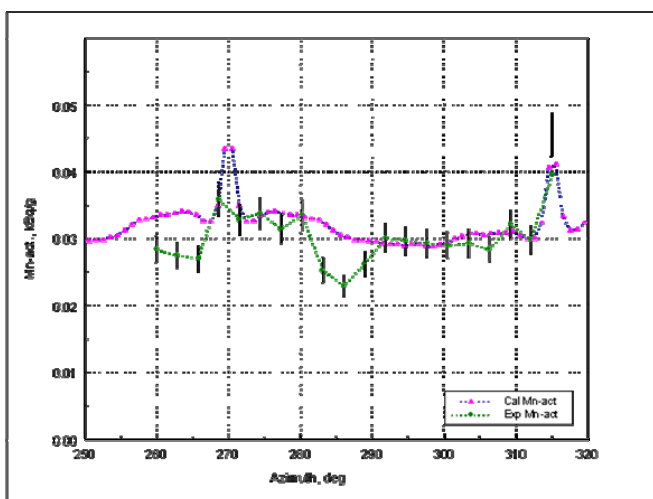


FIGURE 11: AZIMUTH DISTRIBUTION OF THE ACTIVITY FROM THE REACTION $^{54}\text{Fe}(\text{N}, \text{p})^{54}\text{Mn}$ ABOVE THE SUPPORT STRUCTURE, POS.1, CYCLE 17, UNIT 4

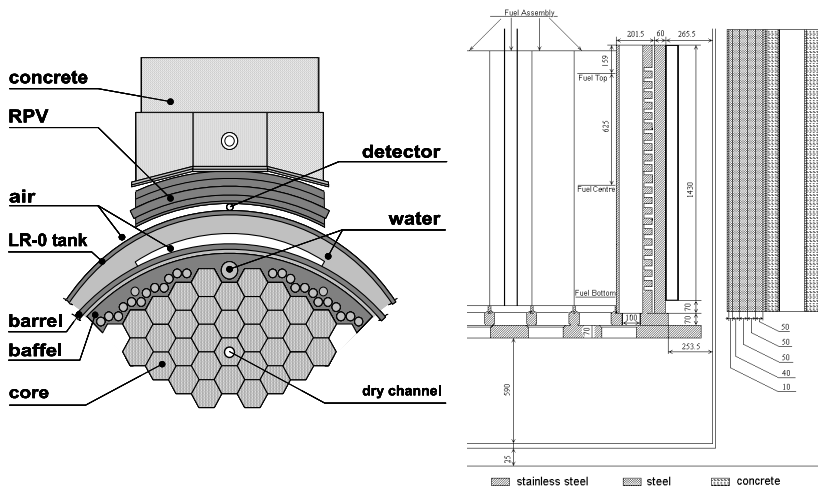


4. INTERNATIONAL COLLABORATION

The neutron fluence evaluation methodology has been developed under research projects of IAEA and EC in close collaboration with working teams from Russia, the Czech Republic, Germany, Spain, Belgium, Hungary and Ukraine, and especially within the activities of the European Working Group on Reactor Dosimetry (EWGRD) and WGRD-VVER group of the countries operating VVER. The WGRD-VVER group, with headquarters in INR, Rez, the Czech Republic, was created in 1990. The EWGRD activity is dated since 1994. In the frames of both groups' activities during the past period more than twelve workshops and meetings have been held where new results, tasks and features were presented, discussed, and planned for further study.

RPV benchmarks have been developed on the base of Mock-ups (Fig.12) created at the critical assembly LR0, INR (Rez, the Czech Republic). The Mock-ups simulate the irradiation conditions of VVER-440 and VVER-1000 vessels. They have been used for validation and improvement of the methodology for RPV neutron fluence evaluation within the international collaboration between researchers from the Czech Republic, Russia, Germany, Bulgaria, Hungary and Ukraine. The works have been done under research projects such as "Reactor Vessel Dosimetry Benchmarks for Commercial VVER-440 Plants" sponsored by USA NRC (1995-1997), RER/4/017 of IAEA (1997-2000), TACIS SRR2/95, and REDOS of EC (2001-2004).

FIGURE 12: VVER-1000 MOCK-UP



The main conclusions followed from the collaboration activity and presented in the most recent finalized project REDOS are:

- Verification of the neutron fluence calculation methods, done on the VVERs benchmarks, has showed that all calculation methods applied by the participants are applicable for neutron fluence evaluation (Fig.13). A good consistency has been demonstrated between the experimental and calculational results (Fig.14);
- The created VVER-440 and VVER-1000 benchmarks could be used in licensing process as well as for education and training of young specialists;
- The sources of uncertainties, as well as the approaches for more precise determination of neutron fluence and RPV lifetime prediction has been estimated;
- The application of ex-vessel (behind the RPV) activation detectors for verification/validation of neutron fluence calculation has been approved. It has been found that the discrepancy between the values of the neutron flux attenuation through the Mock-ups and through NPP vessel is less than 10 %;
- The neutron and gamma fluxes' calculation methodology with more precise modern code MCNP has been revised, benchmarked, and verified; and
- The usage of MCNP code for more precise evaluation has been recommended.

FIGURE 13: NEUTRON FLUX SPECTRA FOR THE VVER-1000 MOCK-UP POINT 2, CALCULATED BY THE PARTICIPANTS

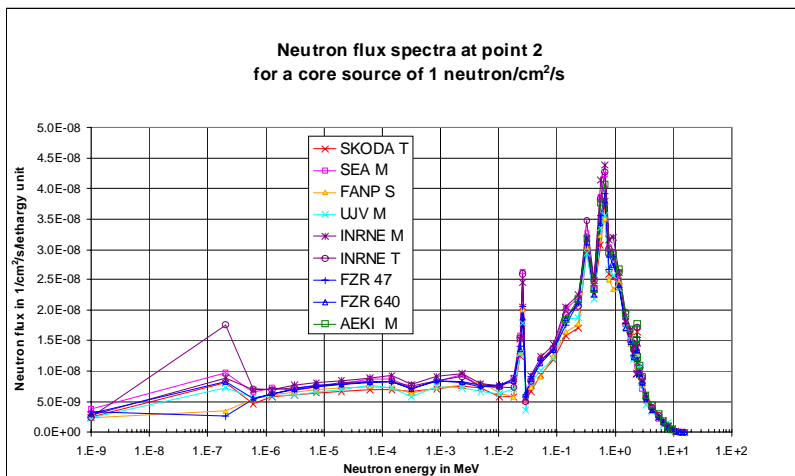
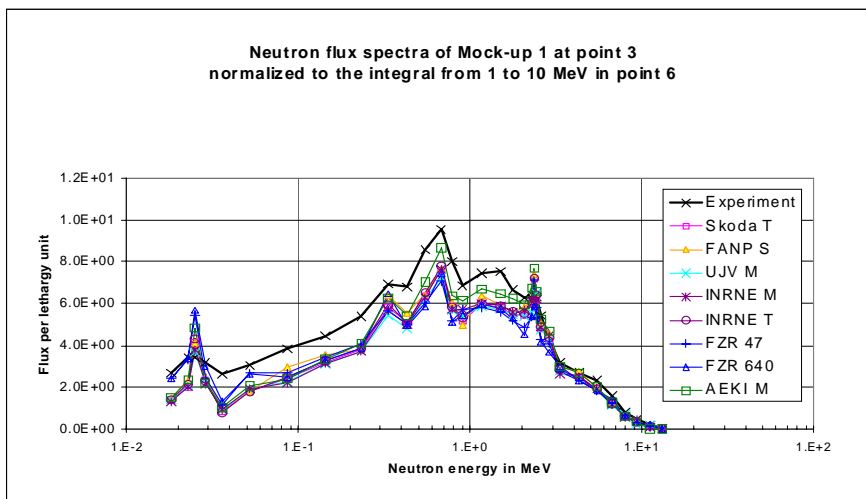


FIGURE 14: CALCULATED NEUTRON FLUX SPECTRA AT POINT 3 OF VVER-440 MOCK-UP 1 NORMALIZED TO THE CALCULATED FLUX INTEGRAL FROM 1 - 10 MEV AT POINT 6 AND CORRESPONDING EXPERIMENTAL NEUTRON FLUX SPECTRUM NORMALIZED TO THE EXPERIMENTAL INTEGRAL FLUX FROM 1 - 10 MEV AT POINT 6



5. CONCLUSIONS AND FURTHER ACTIVITIES

The existing methodology has to be continuously improved in accordance with the last achievements in this field of science and practice in order to meet the state-of-the-art requirements. The nearest step in this connection consists in application of MCNP code for more precise determination of neutron irradiation conditions in surveillance positions of VVER-1000 RPV. The implementation of the MCNP Monte Carlo code when no approximations related to geometry description and/or multigroup energy dependence are applied will permit more accurate determination of the neutron flux on the surveillance specimens of VVER-1000 type of reactors of Kozloduy NPP, Units 5 and 6. It is planned to be applied in near future.

Simultaneously, comprehensive activities are planned to preserve the accumulated experience and its transfer to the young generation of scientists. In this connection the education and training of young researchers take place between our most primary aims. The number of nuclear scientists and technologists seems to be sufficient today, but there are indicators that future expertise is at risk. The education and training process will play the role in retaining and improving the scientific and engineering support. Failure to take appropriate steps now will seriously jeopardize the provision of adequate expertise tomorrow.

The QA maintenance of the codes and measurement tools used in reactor dosimetry is an important task of the reactor dosimetry as to better understand the uncertainties related to different exposure parameters so as to obtain more reliable results on irradiation damage prediction.

Continuous aim is the enhancing of the collaboration between countries in order to gather the efforts and resources for further development of methods for determination of neutron fluence and metal embrittlement. In this sense we shall take part in the next joint projects:

- Project RADE of FP-5 of EC for organizing the workshop “Use of RPV Dosimetry Benchmark’s Results for Determining Radiation Embrittlement Damage”. The main purpose of the project is dissemination of knowledge and training of researchers;
- Project COVERS of EC. The project aims to give a media for maintenance of the joint exchange of information and knowledge, and definition of the further goals in performing more reliable and precise assessment of material damage under irradiation;
- Project PERFECT of EC “Prediction of Irradiation Damage Effects in Reactor Components” which main task is to develop a RPV model for embrittlement damage prediction. The determination of the neutron irradiation conditions is an element of this modeling.

Further improvement of neutron fluence determination methodology will be performed by including adjustment procedure for reducing the evaluation of neutron fluence uncertainty. Adjustment of the neutron fluence based on simplified model for VVER-1000 RPV inner wall has been carried out using the activity measurement data of iron, copper and niobium detectors positioned behind the RPV of Kozloduy NPP Unit 5, cycle 6 (Belousov et al., 2003). The similar adjustment has been done for the fluence on VVER-440 RPV inner wall using data for detectors irradiated behind the RPV of Kozloduy NPP Unit 1, cycle 20 (Belousov and Ilieva, 2005). It was shown that the application of the adjustment could permit to obtain the “best estimated” fluence with reduced evaluation of the neutron fluence uncertainty.

As a routine activity we intend to continue the calculation of the neutron fluence on the reactor vessel and surveillance assemblies at Units 5 and 6 (with VVER-1000) of Kozloduy NPP accumulated during the operational cycles. Verification / validation will be carried out too.

Continuous task of the reactor dosimetry is the QA maintenance of the codes, tools and records.

NOTES

1. All the figures are developed by the authors.

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BROMWICH'S TYPE REPRESENTATIONS FOR SEMIGROUPS OF LINEAR OPERATORS

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ABSTRACT

This note presents a survey of Bromwich's type representation for strongly continuous semigroups of bounded linear operators in Banach spaces. For this purpose we introduce a special class of Jordan's curves to obtain a Riesz-Dunford type representation and then a Bromwich type representation for uniformly continuous semigroups. To obtain a Bromwich type representation for C_0 -semigroups, we use the properties of an extension of Yosida approximation.

Keywords: Strongly Continuous Semigroups; Bromwich Representation; Yosida Approximation.

1. PRELIMINARY

Let E be a complex Banach space. By $B(E)$ we denote the Banach algebra of bounded linear operators on E . For a closed linear operator A , not necessarily bounded, with domain $D(A)$ in the space E , denote by $\rho(A)$ and $R(\cdot, A)$ the resolvent set of A and the resolvent of A , respectively.

The family of operators $\{T(t)\}_{t \geq 0} \subset B(E)$ is said to be a *semigroup of bounded linear operators on E* if

- (i) $T(0)=I$ (I is the identity operator on E);
- (ii) $T(t+s)=T(t)T(s)$ for all $t, s \geq 0$ (the semigroup property).

The semigroup $\{T(t)\}_{t \geq 0} \subset B(E)$ is said to be *uniformly continuous* if $t \mapsto T(t)$ is continuous on $[0, \infty)$ in the uniform operator topology.

Due to the semigroup property this is equivalent to:

$$(1.1) \quad \lim_{t \downarrow 0} \|T(t) - I\| = 0$$

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The semigroup $\{T(t)\}_{t \geq 0}$ of bounded linear operators on E is said to be *strongly continuous* on $[0, \infty)$ if it is continuous in the strong operator topology:

$$(1.2) \quad \lim_{t \downarrow 0} \|T(t)x - x\| = 0, \quad \forall x \in E.$$

A strongly continuous semigroups of bounded linear operators on E will be called a *semigroup of class C_0* or simply *C_0 - semigroup*.

The most important object associated to a C_0 - semigroup $\{T(t)\}_{t \geq 0}$ is its infinitesimal generator. The linear operator A defined by:

$$(1.3) \quad D(A) = \left\{ x \in E : \lim_{t \downarrow 0} \frac{T(t)x - x}{t} \text{ exists} \right\}$$

and

$$(1.4) \quad Ax = \lim_{t \downarrow 0} \frac{T(t)x - x}{t}, \quad \forall x \in D(A)$$

is the *infinitesimal generator* of the semigroup $\{T(t)\}_{t \geq 0}$. Clearly the operator $A : D(A) \subseteq E \rightarrow E$ is linear but not necessarily bounded unless $D(A)$ is all of E . Nathan (1935) and Yosida (1936) proved that the infinitesimal generator of a semigroup is a bounded linear operator in E if and only if the semigroup is uniformly continuous.

For every C_0 - semigroup $\{T(t)\}_{t \geq 0}$ constants $\omega \geq 0$ and $M \geq 1$ exist such that

$$(1.5) \quad \|T(t)\| \leq Me^{\omega t}, \quad \forall t \geq 0.$$

So by $SG(M, \omega)$ we denote the set of this C_0 - semigroups which is said to be *exponentially bounded* and by Λ_ω the set $\{\lambda \in \mathbb{C} : \operatorname{Re} \lambda > \omega\}$. In the case of an exponentially bounded semigroup, the resolvent of generator A is the Laplace transform of the semigroup:

$$(1.6) \quad R(\lambda; A) = \int_0^\infty e^{-\lambda t} T(t) dt, \quad \forall \lambda \in \Lambda_\omega.$$

For more information about C_0 - semigroup we refer to Butzer and Berens (1967), Davies (1980), Hille and Phillips (1957), Pazy (1983), Yosida (1967) and the references therein.

2. THE EXTENDED YOSIDA APPROXIMATION OF INFINITESIMAL GENERATOR

The next Lemma follows from (Pazy, 1983:9).

2.1. Lemma

Let $A : D(A) \subset E \rightarrow E$ be a linear (unbounded) operator which satisfy the conditions:

i) A is closed and $\overline{D(A)} = E$;

ii) constants $\omega \geq 0$ and $M \geq 1$ exist such that $\Lambda_\omega \subset \rho(A)$ and for every $\lambda \in \Lambda_\omega$, we have:

$$(2.1) \quad \|R(\lambda; A)^n\| \leq \frac{M}{(\operatorname{Re} \lambda - \omega)^n}, \quad \forall n \in \mathbb{N}^*.$$

Then for all $\lambda \in \Lambda_\omega$, we have:

$$(2.2) \quad \lim_{\operatorname{Re} \lambda \rightarrow \infty} \lambda R(\lambda; A)x = x, \quad \forall x \in E.$$

Moreover, $\lambda AR(\lambda; A) \in B(E)$ and

$$(2.3) \quad \lim_{\operatorname{Re} \lambda \rightarrow \infty} \lambda AR(\lambda; A)x = Ax, \quad \forall x \in D(A).$$

Proof: Let $x \in D(A)$ and $\lambda \in C$ be such that $\operatorname{Re} \lambda > \omega$. Then $R(\lambda; A)(\lambda I - A)x = x$. For $\operatorname{Re} \lambda \rightarrow \infty$, we have:

$$(2.4) \quad \begin{aligned} \|\lambda R(\lambda; A)x - x\| &= \|R(\lambda; A)x\| \leq \|R(\lambda; A)\| \cdot \|Ax\| \leq \\ &\leq \frac{M}{\operatorname{Re} \lambda - \omega} \|Ax\| \rightarrow 0 \end{aligned}$$

from where one can deduce that:

$$(2.5) \quad \lim_{\operatorname{Re} \lambda \rightarrow \infty} \lambda R(\lambda; A)x = x, \quad \forall x \in D(A).$$

For $x \in E$, because $\overline{D(A)} = E$, there exists a sequence $(x_n)_{n \in \mathbb{N}} \subset D(A)$ such that $x_n \rightarrow x$ and $n \rightarrow \infty$. We obtain:

$$(2.6) \quad \begin{aligned} \|\lambda R(\lambda; A)x - x\| &\leq \|\lambda R(\lambda; A)x - \lambda R(\lambda; A)x_n\| + \|\lambda R(\lambda; A)x_n - x_n\| + \\ &+ \|x_n - x\| \leq \frac{|\lambda| M + \operatorname{Re} \lambda - \omega}{\operatorname{Re} \lambda - \omega} \|x_n - x\| + \frac{M}{\operatorname{Re} \lambda - \omega} \|Ax_n\| \end{aligned}$$

But $x_n \rightarrow x$ as $n \rightarrow \infty$. Hence for any $\varepsilon > 0$, there exists $n_\varepsilon \in \mathbb{N}$ such that:

$$(2.7) \quad \|x_n - x\| < \varepsilon \frac{\operatorname{Re} \lambda - \omega}{|\lambda| M + \operatorname{Re} \lambda - \omega}.$$

Consequently:

$$(2.8) \quad \|\lambda R(\lambda; A)x - x\| < \varepsilon + \frac{M}{\operatorname{Re} \lambda - \omega} \|Ax_{n_\varepsilon}\|$$

from where it follows that,

$$(2.9) \quad \lim_{\operatorname{Re} \lambda \rightarrow \infty} \|\lambda R(\lambda; A)x - x\| < \varepsilon, \quad \forall x \in E,$$

that is:

$$(2.10) \quad \lim_{\operatorname{Re} \lambda \rightarrow \infty} \lambda R(\lambda; A)x = x, \quad \forall x \in E.$$

Moreover:

$$(2.11) \quad \begin{aligned} \lambda AR(\lambda; A) &= \lambda [\lambda I - (\lambda I - A)] R(\lambda; A) = \\ &= \lambda [\lambda R(\lambda; A) - I] = \lambda^2 R(\lambda; A) - \lambda I. \end{aligned}$$

Then we have:

$$\|\lambda AR(\lambda; A)x\| = \|\lambda [\lambda R(\lambda; A) - I]x\| \leq |\lambda| \|\lambda R(\lambda; A)x - x\| \leq$$

$$(2.12) \quad \leq |\lambda| (\|\lambda R(\lambda; A)x\| + \|x\|) \leq |\lambda| \left(\frac{|\lambda| M}{\operatorname{Re} \lambda - \omega} + 1 \right) \|x\|, \quad \forall x \in E$$

so we deduce that: $\lambda AR(\lambda; A) \in B(E)$.

If $x \in D(A)$, then it follows:

$$(2.13) \quad \lambda R(\lambda; A)Ax = [\lambda^2 R(\lambda; A) - \lambda I]x = \lambda AR(\lambda; A)x,$$

from where we conclude that:

$$(2.14) \quad \lim_{\operatorname{Re} \lambda \rightarrow \infty} \lambda AR(\lambda; A)x = \lim_{\operatorname{Re} \lambda \rightarrow \infty} \lambda R(\lambda; A)Ax = Ax, \quad \forall x \in D(A).$$

2.2. Remark

We can say that the bounded operators $\lambda AR(\lambda; A)$ are some approximations of the operator A which is unbounded. So we can introduce the next definition, which generalizes the Yosida approximation (Pazy, 1983:9).

2.3. Definition

The family $\{A_\lambda\}_{\lambda \in \Lambda_\omega} \subset B(E)$, where $A_\lambda = \lambda AR(\lambda; A)$, is called the extended Yosida approximation of A .

2.4. Theorem

Let A be the infinitesimal generator of a C_0 -semigroup $\{T(t)\}_{t \geq 0} \in SG(M, \omega)$ and let $\{A_\mu\}_{\mu \in \Lambda_\omega}$ be the extended Yosida approximation of A . Then for all $\mu \in \Lambda_\omega$ there is a constant $\Omega > \omega$ such that $\Lambda_\Omega \subset \rho(A_\mu)$ and for each $\lambda \in \Lambda_\Omega$ we have:

$$(2.15) \quad \|R(\lambda; A_\mu)\| \leq \frac{M}{\operatorname{Re} \lambda - \Omega}.$$

Moreover, for $\varepsilon > 0$, there is a constant $C > 0$ (depending only on M and ε) such that for every $x \in D(A)$,

$$(2.16) \quad \|R(\lambda; A_\mu)x\| \leq \frac{C}{|\lambda|} (\|x\| + \|Ax\|),$$

for all $\lambda, \mu \in C$, with $\operatorname{Re} \lambda > \Omega + \varepsilon$ and $\operatorname{Re} \mu > \omega + \frac{|\mu|}{2}$.

Proof: Let $\mu \in \Lambda_\omega$ be fixed. We note that A_μ is the infinitesimal generator of the uniformly continuous semigroup $\{e^{tA_\mu}\}_{t \geq 0}$.

We obtain:

$$\begin{aligned} \|e^{tA_\mu}\| &= \|e^{t(\mu^2 R(\mu; A) - \mu I)}\| = \|e^{-\mu t I} e^{\mu^2 t R(\mu; A)}\| \leq e^{-\operatorname{Re} \mu t} \left\| \sum_{k=0}^{\infty} \frac{t^k \mu^{2k} R(\mu; A)^k}{k!} \right\| \leq \\ &\leq e^{-\operatorname{Re} \mu t} \sum_{k=0}^{\infty} \frac{t^k |\mu|^{2k} \|R(\mu; A)^k\|}{k!} \leq e^{-\operatorname{Re} \mu t} \sum_{k=0}^{\infty} \frac{t^k |\mu|^{2k} M}{k! (\operatorname{Re} \mu - \omega)^k} = \end{aligned}$$

$$(2.17) \quad = Me^{-\operatorname{Re} \mu} \sum_{k=0}^{\infty} \frac{\left(\frac{t |\mu|^2}{\operatorname{Re} \mu - \omega} \right)^k}{k!} = Me^{-\operatorname{Re} \mu} e^{\frac{t |\mu|^2}{\operatorname{Re} \mu - \omega}} = Me^{\frac{\omega \operatorname{Re} \mu + \operatorname{Im}^2 \mu}{\operatorname{Re} \mu - \omega} t}.$$

If we denote,

$$(2.18) \quad \Omega = \frac{\omega \operatorname{Re} \mu + \operatorname{Im}^2 \mu}{\operatorname{Re} \mu - \omega}$$

then it follows that:

$$(2.19) \quad \Omega = \omega + \frac{\omega^2 + \operatorname{Im}^2 \mu}{\operatorname{Re} \mu - \omega} > \omega$$

and that $\Lambda_{\Omega} = \{\lambda \in C \mid \operatorname{Re} \lambda > \Omega\} \subset \rho(A\mu)$.

Furthermore, for each $\lambda \in \Lambda_{\Omega}$ we obtain:

$$(2.20) \quad \|R(\lambda; A_{\mu})\| \leq \frac{M}{\operatorname{Re} \lambda - \Omega}.$$

For $\lambda \in C$ with the property $\operatorname{Re} \lambda > \Omega + \varepsilon$, $\varepsilon > 0$, it follows that:

$$(2.21) \quad \|R(\lambda; A_{\mu})\| \leq \frac{M}{\varepsilon}.$$

If $x \in D(A)$ and $\mu \in \Lambda_{\omega}$ is such that $\operatorname{Re} \mu > \omega + \frac{|\mu|}{2}$, then

$$(2.22) \quad \begin{aligned} \|A_{\mu}x\| &= \|\mu R(\mu; A)Ax\| \leq |\mu| \|R(\mu; A)\| \|Ax\| \leq \\ &\leq |\mu| \frac{M}{\operatorname{Re} \mu - \omega} \|Ax\| \leq 2M \|Ax\| \end{aligned}$$

By the equality $(\lambda I - A_{\mu})R(\lambda; A_{\mu}) = I$, we deduce that:

$$(2.23) \quad R(\lambda; A_{\mu}) = \frac{1}{\lambda} I + \frac{1}{\lambda} R(\lambda; A_{\mu})A_{\mu}$$

and therefore,

$$(2.24) \quad \begin{aligned} \|R(\lambda; A_{\mu})x\| &\leq \frac{1}{|\lambda|} (\|x\| + \|R(\lambda; A_{\mu})\| \|A_{\mu}x\|) \leq \\ &\leq \frac{1}{|\lambda|} \left(\|x\| + \frac{2M^2}{\varepsilon} \|Ax\| \right) \leq \frac{C}{|\lambda|} (\|x\| + \|Ax\|), \quad \forall x \in D(A) \end{aligned}$$

where the constants C depends only on M and ε .

2.5. Theorem

Let A be the infinitesimal generator of a C_0 -semigroup $\{T(t)\}_{t \geq 0} \in SG(M, \omega)$, let $\{A_\mu\}_{\mu \in \Lambda_\omega}$ be the extended Yosida approximation of A and $\lambda \in \mathbb{C}$ such that $\operatorname{Re} \lambda > \omega + \varepsilon$ is fixed for $\varepsilon > 0$. Then,

$$(2.25) \quad \lim_{\operatorname{Re} \mu \rightarrow \infty} R(\lambda; A_\mu)x = R(\lambda; A)x, \quad \forall x \in E$$

and for every $k > 0$, the limit is uniform in $\operatorname{Im} \lambda \in [-k, k]$.

Proof: By the Theorem 2.4, we deduce that for $\nu \in \Lambda_\omega$, there is $\Omega > \omega$ such that $\Lambda_\Omega \subset \rho(A_\nu)$. We have:

$$(2.26) \quad \Omega = \frac{\omega \operatorname{Re} \nu + \operatorname{Im}^2 \nu}{\operatorname{Re} \nu - \omega}.$$

Thus the inequality $\operatorname{Re} \lambda > \Omega$ is equivalent to:

$$(2.27) \quad \operatorname{Re} \lambda > \omega + \frac{\omega^2 + \operatorname{Im} \nu}{\operatorname{Re} \nu - \omega}.$$

Let $\varepsilon > 0$. If $\mu \in \Lambda_\omega$ is such that $\frac{\omega^2 + \operatorname{Im} \mu}{\operatorname{Re} \nu - \omega} < \varepsilon$, then $\operatorname{Re} \lambda > \omega + \varepsilon$ implies $\operatorname{Re} \lambda > \Omega$. Hence $\lambda \in \rho(A_\mu)$. By the Theorem 2.4 it follows:

$$(2.28) \quad \|R(\lambda; A_\mu)\| \leq \frac{M}{\operatorname{Re} \lambda - \omega}.$$

On the other hand, we have,

$$(2.29) \quad \begin{aligned} \operatorname{Re} \frac{\lambda \mu}{\lambda + \mu} &= \operatorname{Re} \left(\lambda - \frac{\lambda^2}{\lambda + \mu} \right) = \\ &= \operatorname{Re} \lambda - \operatorname{Re} \frac{\lambda^2}{\lambda + \mu} > \omega + \varepsilon - \operatorname{Re} \frac{\lambda^2}{\lambda + \mu}. \end{aligned}$$

Given $k > 0$ such that $|\operatorname{Im} \lambda| \leq k$, we can find $\mu \in \Lambda_\omega$ such that $\operatorname{Re} \frac{\lambda^2}{\lambda + \mu} < \frac{\varepsilon}{2}$. Then $\operatorname{Re} \frac{\lambda \mu}{\lambda + \mu} > \omega + \frac{\varepsilon}{2}$ and consequently, $\frac{\lambda \mu}{\lambda + \mu} \in \rho(A)$.

We have:

$$\begin{aligned}
 & \frac{1}{\lambda + \mu} (\lambda I - A_\mu) (\mu I - A) R\left(\frac{\lambda \mu}{\lambda + \mu}; A\right) = \\
 & = \frac{1}{\lambda + \mu} [\lambda I - \mu^2 R(\mu; A) + \mu I] (\mu I - A) R\left(\frac{\lambda \mu}{\lambda + \mu}; A\right) = \\
 (2.30) \quad & = \left[\mu I - A - \frac{\mu^2}{\lambda + \mu} I \right] R\left(\frac{\lambda \mu}{\lambda + \mu}; A\right) = \left(\frac{\lambda \mu}{\lambda + \mu} I - A \right) R\left(\frac{\lambda \mu}{\lambda + \mu}; A\right) = I
 \end{aligned}$$

Similarly,

$$(2.31) \quad \frac{1}{\lambda + \mu} (\lambda I - A) R\left(\frac{\lambda \mu}{\lambda + \mu}; A\right) (\lambda I - A_\mu) = I.$$

Therefore,

$$(2.32) \quad R(\lambda; A_\mu) = \frac{1}{\lambda + \mu} (\mu I - A) R\left(\frac{\lambda \mu}{\lambda + \mu}; A\right).$$

It follows that:

$$\begin{aligned}
 & R(\lambda; A_\mu) - R(\lambda; A) = \frac{1}{\lambda + \mu} (\mu I - A) R\left(\frac{\lambda \mu}{\lambda + \mu}; A\right) - R(\lambda; A) = \\
 & = \frac{1}{\lambda + \mu} \left[(\mu I - A) R\left(\frac{\lambda \mu}{\lambda + \mu}; A\right) - (\lambda - \mu) R(\lambda; A) \right] = \\
 & = \frac{1}{\lambda + \mu} (\mu I - A) R\left(\frac{\lambda \mu}{\lambda + \mu}; A\right) A^2 R(\mu; A) R(\lambda; A) = \\
 (2.33) \quad & = \frac{1}{\lambda + \mu} R\left(\frac{\lambda \mu}{\lambda + \mu}; A\right) R(\lambda; A) A^2.
 \end{aligned}$$

If $x \in D(A^2)$, we have:

$$\begin{aligned}
 & \|R(\lambda; A_\mu)x - R(\lambda; A)x\| \leq \\
 & \leq \frac{1}{|\lambda + \mu|} \left\| R\left(\frac{\lambda \mu}{\lambda + \mu}; A\right) \right\| \|R(\lambda; A)\| \|A^2 x\| \leq \\
 (2.34) \quad & \leq \frac{1}{|\mu|} \frac{2M}{\varepsilon} \frac{M}{\varepsilon} \|A^2 x\| \leq \frac{1}{\operatorname{Re} \mu} \frac{2M^2}{\varepsilon^2} \|A^2 x\|
 \end{aligned}$$

from where it follows:

$$(2.35) \quad \lim_{\operatorname{Re} \mu \rightarrow \infty} R(\lambda; A_\mu)x = R(\lambda; A)x \quad , \quad \forall x \in D(A^2)$$

and the limit is uniform in $\operatorname{Im} \lambda \in [-k, k]$, for every $k > 0$. Since $D(A^2)$ is dense in E , and $R(\lambda; A)$ and $R(\lambda; A_\mu)$ are uniformly bounded, we conclude that:

$$(2.36) \quad \lim_{\operatorname{Re} \mu \rightarrow \infty} R(\lambda; A_\mu)x = R(\lambda; A)x \quad , \quad \forall x \in E$$

and for every $k > 0$, the limit is uniform in $\operatorname{Im} \lambda \in [-k, k]$.

The following result is an immediate consequence of Hille-Yosida theorem:

2.6. Corollary

Let A be the generator of a C_0 -semigroup $\{T(t)\}_{t \geq 0} \in SG(M, \omega)$ and let $\{A_\lambda\}_{\lambda \in \Lambda_\omega}$ be the extended Yosida approximation of A . Then for each $x \in E$ we have,

$$(2.37) \quad T(t)x = \lim_{\operatorname{Re} \lambda \rightarrow \infty} e^{tA_\lambda}x,$$

uniformly for t in bounded intervals of $[0, \infty)$.

3. BROMWICH'S TYPE REPRESENTATIONS

This section is dedicated to the problem of representing the semigroup $\{T(t)\}_{t \geq 0}$ in terms of its infinitesimal generator. We obtain the semigroup from the resolvent of A by inverting the Laplace transform. For this purpose we use a special class of Jordan's curves for a bounded linear operator introduced by Reghiş and Babescu (1980).

3.1. Definition

A Jordan closed smooth curve which surrounds $\sigma(A)$ is said to be A -spectral if it is homotope to a circle C_r of radius $r > \|A\|$ centered at the origin.

The next theorem presents Riesz-Dunford's type representation for uniformly continuous semigroups.

3.2. Theorem

Let A be the infinitesimal generator of the uniformly continuous semigroup $\{T(t)\}_{t \geq 0}$. If Γ_A is an A -spectral curve then,

$$(3.1) \quad T(t) = \frac{1}{2\pi i} \int_{\Gamma_A} e^{\lambda t} R(\lambda; A) d\lambda \quad , \quad \forall t \geq 0.$$

Proof: Let Γ_A be an A -spectral curve. Then Γ_A is homotope to the circle C_r of radius $r > \|A\|$ centered at the origin. We have:

$$(3.2) \quad \frac{1}{2\pi i} \int_{\Gamma_A} e^{\lambda t} R(\lambda; A) d\lambda = \frac{1}{2\pi i} \int_{C_r} e^{\lambda t} R(\lambda; A) d\lambda \quad , \quad \forall t \geq 0.$$

But the series,

$$(3.3) \quad R(\lambda; A) = \sum_{n=0}^{\infty} \frac{A^n}{\lambda^{n+1}}$$

converges uniformly for λ on a compact set of $\{\lambda \in C : |\lambda| > \|A\|\}$, particularly on circle C_r . Then,

$$(3.4) \quad \frac{1}{2\pi i} \int_{C_r} e^{\lambda t} R(\lambda; A) d\lambda = \frac{1}{2\pi i} \int_{C_r} e^{\lambda t} \sum_{n=0}^{\infty} \frac{A^n}{\lambda^{n+1}} d\lambda = \sum_{n=0}^{\infty} \frac{1}{2\pi i} \int_{C_r} \frac{e^{\lambda t}}{\lambda^{n+1}} d\lambda A^n.$$

Using the identities,

$$(3.5) \quad \frac{1}{2\pi i} \int_{C_r} \frac{e^{\lambda t}}{\lambda^{n+1}} d\lambda = \frac{t^n}{n!} \quad , \quad \forall n \in N,$$

we conclude that:

$$(3.6) \quad \frac{1}{2\pi i} \int_{\Gamma_A} e^{\lambda t} R(\lambda; A) d\lambda = \sum_{n=0}^{\infty} \frac{t^n A^n}{n!} = T(t) \quad , \quad \forall t \geq 0.$$

The next theorem presents Bromwich's type representation theorem for uniformly continuous semigroups.

3.3. Theorem

Let A be the infinitesimal generator of the uniformly continuous semigroup $\{T(t)\}_{t \geq 0}$. If $a > \|A\|$, then,

$$(3.7) \quad T(t) = \frac{1}{2\pi i} \int_{a-i\infty}^{a+i\infty} e^{zt} R(z; A) dz$$

and the integral converges uniformly for t in bounded intervals.

Proof: Let $a > \|A\|$. For $R > 2a$ we consider Jordan's closed smooth curve

$$(3.8) \quad \Gamma_R = \Gamma'_R \cup \Gamma''_R$$

where

$$(3.9) \quad \Gamma'_R = \{a + i\tau : \tau \in [-R, R]\}$$

and

$$(3.10) \quad \Gamma''_R = \left\{ a + R(\cos \varphi + i \sin \varphi) : \varphi \in \left[\frac{\pi}{2}, \frac{3\pi}{2} \right] \right\}$$

For $z \in \Gamma'_R$ we have,

$$(3.11) \quad |z| = |a + i\tau| > a > \|A\|$$

and for $z \in \Gamma''_R$ we find:

$$(3.12) \quad |z| = |a + R(\cos \varphi + i \sin \varphi)| = |a - [-R(\cos \varphi + i \sin \varphi)]| \geq |a - R| > \|A\|.$$

Therefore from $z \in \Gamma_R$ it follows $z \in \rho(A)$. Moreover, Γ_R is homotop to the circle C of radius $R-a$ centered at the origin. Then Γ_R is an A-spectral curve and from theorem 3.2 it follows that:

$$(3.13) \quad T(t) = \frac{1}{2\pi i} \int_{\Gamma_R} e^{zt} R(z; A) dz, \quad \forall t \geq 0$$

for every $R > 2a$. If we denote,

$$(3.14) \quad I'_t(R) = \frac{1}{2\pi i} \int_{\Gamma'_R} e^{zt} R(z; A) dz$$

and

$$(3.15) \quad I''_t(R) = \frac{1}{2\pi i} \int_{\Gamma''_R} e^{zt} R(z; A) dz$$

we can see that:

$$(3.16) \quad T(t) = I'(R) + I''(R) \quad , \quad \forall t \geq 0.$$

Next we show that:

$$(3.17) \quad \lim_{R \rightarrow \infty} \frac{1}{2\pi i} \int_{\Gamma_R^n} e^{zt} R(z; A) dz = 0$$

uniformly for t in bounded intervals. To this end we use the series:

$$(3.18) \quad R(z; A) = \sum_{n=0}^{\infty} \frac{A^n}{z^{n+1}}$$

which converges uniformly for z on compact set of $\{z \in C : |z| > \|A\|\}$, particularly on Γ_R^n . For every $R > 2a$ and every $t \geq 0$ we have:

$$(3.19) \quad I''(R) = \sum_{n=0}^{\infty} \left(\frac{1}{2\pi i} \int_{\Gamma_R^n} \frac{e^{zt}}{z^{n+1}} A^n dz \right) = \left(\frac{1}{2\pi i} \int_{\Gamma_R^n} \frac{e^{zt}}{z} dz \right) I + \sum_{n=1}^{\infty} \left(\frac{1}{2\pi i} \int_{\Gamma_R^n} \frac{e^{zt}}{z^{n+1}} dz \right) A^n$$

We consider:

$$(3.20) \quad A_t(R) = \left(\frac{1}{2\pi i} \int_{\Gamma_R^n} \frac{e^{zt}}{z} dz \right) I$$

and

$$(3.21) \quad B_t(R) = \sum_{n=1}^{\infty} \left(\frac{1}{2\pi i} \int_{\Gamma_R^n} \frac{e^{zt}}{z^{n+1}} dz \right) A^n$$

Changing variables to:

$$(3.22) \quad z = a + R(\cos \varphi + i \sin \varphi) \quad , \quad \varphi \in \left[\frac{\pi}{2}, \frac{3\pi}{2} \right]$$

we obtain:

$$A_t(R) = \left[\frac{1}{2\pi i} \int_{\frac{\pi}{2}}^{\frac{3\pi}{2}} \frac{e^{t(a+R \cos \varphi + i \sin \varphi)}}{z} R(-\sin \varphi + i \cos \varphi) d\varphi \right] I =$$

$$(3.23) \quad = \left[\frac{R}{2\pi} e^{ta} \int_{\frac{\pi}{2}}^{\frac{3\pi}{2}} e^{tR \cos \varphi} e^{itR \sin \varphi} \frac{1}{z} (\cos \varphi + i \sin \varphi) d\varphi \right] I$$

from where one deduces that:

$$(3.24) \quad \begin{aligned} \|A_t(R)\| &\leq \frac{R}{2\pi} e^{ta} \int_{\frac{\pi}{2}}^{\frac{3\pi}{2}} e^{tR \cos \varphi} \|e^{itR \sin \varphi}\| \frac{1}{|z|} |\cos \varphi + i \sin \varphi| d\varphi \leq \\ &\leq \frac{R}{2\pi} e^{ta} \int_{\frac{\pi}{2}}^{\frac{3\pi}{2}} e^{tR \cos \varphi} \frac{1}{R-a} d\varphi \leq \frac{1}{2\pi} \frac{R}{R-a} \int_{\frac{\pi}{2}}^{\frac{3\pi}{2}} e^{tR \cos \varphi} d\varphi \end{aligned}$$

since for $z \in \Gamma''_R$ we have

$$(3.25) \quad |z| = |a + R(\cos \varphi + i \sin \varphi)| > R - a$$

therefore,

$$(3.26) \quad \frac{1}{|z|} < \frac{R}{R-a}.$$

Consider $0 < t_1 < t_2$ and $t \in [t_1, t_2]$. From the inequality $R > 2a$, it follows that $2R - 2a > R$ and therefore,

$$(3.27) \quad \frac{R}{R-a} < 2.$$

Consequently,

$$(3.28) \quad \|A_t(R)\| \leq \frac{1}{\pi} e^{ta} \int_{\frac{\pi}{2}}^{\frac{3\pi}{2}} e^{tR \cos \varphi} d\varphi \leq \frac{1}{\pi} e^{t_2 a} \int_{\frac{\pi}{2}}^{\frac{3\pi}{2}} e^{t_1 R \cos \varphi} d\varphi$$

But for every $\varphi \in \left[\frac{\pi}{2}, \frac{3\pi}{2}\right]$ one obtains $e^{t_1 R \cos \varphi} \leq 1$ and we have:

$$(3.29) \quad \lim_{R \rightarrow \infty} e^{t_1 R \cos \varphi} = 0.$$

By Lebesgue's bounded convergences theorem it follows:

$$(3.30) \quad \lim_{R \rightarrow \infty} \int_{\frac{\pi}{2}}^{\frac{3\pi}{2}} e^{t_1 R \cos \varphi} d\varphi = 0$$

So we deduce that:

$$(3.31) \quad \lim_{R \rightarrow \infty} A_t(R) = 0$$

and the limit is uniform for $t \in [t_1, t_2]$.

We consider now the integral,

$$(3.32) \quad B_t(R) = \sum_{n=1}^{\infty} \left(\frac{1}{2\pi i} \int_{\Gamma_R^n} \frac{e^{zt}}{z^{n+1}} dz \right) A^n$$

For every $t \in [t_1, t_2]$ and $R > 2a$ we have,

$$(3.33) \quad e^{tR \cos \varphi} \leq 1, \quad \forall \varphi \in \left[\frac{\pi}{2}, \frac{3\pi}{2} \right].$$

So that,

$$(3.34) \quad \left| \int_{\Gamma_R^n} \frac{e^{zt}}{z^{n+1}} dz \right| \leq \frac{\operatorname{Re}^{ta}}{(R-a)^{n+1}} \int_{\frac{\pi}{2}}^{\frac{3\pi}{2}} e^{tR \cos \varphi} d\varphi \leq \pi e^{ta} \frac{R}{(R-a)^{n+1}}$$

Since $R > 2a > a + \|A\|$, it follows:

$$(3.35) \quad \|B_t(R)\| \leq \sum_{n=1}^{\infty} \frac{\|A\|^n}{2\pi} \left| \int_{\Gamma_R^n} \frac{e^{zt}}{z^{n+1}} dz \right| \leq \frac{e^{ta}}{2} \frac{R}{R-a} \sum_{n=1}^{\infty} \left(\frac{\|A\|}{R-a} \right)^n$$

and because,

$$(3.36) \quad \frac{\|A\|}{R-a} < 1$$

one deduces that:

$$(3.37) \quad \|B_t(R)\| \leq e^{ta} \frac{\|A\|}{2} \frac{R}{R-a} \frac{1}{R-a-\|A\|}.$$

Consequently,

$$(3.38) \quad \lim_{R \rightarrow \infty} B_t(R) = 0$$

and the limit is uniform for $t \in [t_1, t_2]$.

Then we have:

$$(3.39) \quad \lim_{R \rightarrow \infty} I''(R) = 0$$

uniformly for $t \in [t_1, t_2]$ from where we conclude that:

$$(3.40) \quad T(t) = \lim_{R \rightarrow \infty} \frac{1}{2\pi i} \int_{\Gamma_R} e^{zt} R(z; A) dz = \frac{1}{2\pi i} \int_{a-i\infty}^{a+i\infty} e^{zt} R(z; A) dz$$

and the integral converges uniformly for $t \in [t_1, t_2]$.

3.4. Proposition

Let A be the infinitesimal generator of a C_0 -semigroup $\{T(t)\}_{t \geq 0}$ and $a > \omega$. If $x \in D(A)$ then,

$$(3.41) \quad \int_0^t T(s)x ds = \frac{1}{2\pi i} \int_{a-i\infty}^{a+i\infty} e^{zt} R(z; A)x \frac{dz}{z}$$

and the integral on the right converges uniformly for t in bounded intervals.

Proof: Let $\{A_\mu\}_{\mu \in \Lambda_\omega}$ be the extended Yosida approximation of A and let $\mu \in \Lambda_\omega$ be fixed. By Theorem 2.4 we can find,

$$(3.42) \quad \Omega = \frac{\omega \operatorname{Re} \mu + \operatorname{Im}^2 \mu}{\operatorname{Re} \mu - \omega} > \omega$$

such that $\Lambda_\Omega = \{\lambda \in C : \operatorname{Re} \lambda > \Omega\} \subset \rho(A_\mu)$. Let $a > \Omega$. Using Theorem 3.3 for $R > 2a$ we can consider the A_μ -spectral curve

$$(3.43) \quad \Gamma^I_R = \Gamma^{I'}_R \cup \Gamma^{I''}_R$$

where,

$$(3.44) \quad \Gamma^{I'}_R = \{a + i\tau : \tau \in [-R, R]\}$$

and

$$(3.45) \quad \Gamma^{I''}_R = \left\{ a + R(\cos \varphi + i \sin \varphi) : \varphi \in \left[\frac{\pi}{2}, \frac{3\pi}{2} \right] \right\}.$$

For the uniformly continuous semigroup $\{e^{tA_\mu}\}_{t \geq 0}$ generated by A_μ we have:

$$(3.46) \quad e^{tA_\mu} = \lim_{R \rightarrow \infty} \frac{1}{2\pi i} \int_{a-iR}^{a+iR} e^{zt} R(z; A_\mu) dz = \frac{1}{2\pi i} \int_{a-i\infty}^{a+i\infty} e^{zt} R(z; A_\mu) dz,$$

uniformly for t in bounded intervals. For $R > 2a$ and for every $x \in D(A)$ we denote:

$$(3.47) \quad I_R(s) = \frac{1}{2\pi i} \int_{a-iR}^{a+iR} e^{zs} R(z; A_\mu) x dz$$

Consider $0 < t_1 < t_2$ and $t \in [t_1, t_2]$. Then,

$$(3.48) \quad \begin{aligned} \int_0^t I_R(s) ds &= \frac{1}{2\pi i} \int_0^t \int_{a-iR}^{a+iR} e^{zs} R(z; A_\mu) x dz ds = \frac{1}{2\pi i} \int_{a-iR}^{a+iR} \int_0^t e^{zs} ds R(z; A_\mu) x dz = \\ &= \frac{1}{2\pi i} \int_{a-iR}^{a+iR} e^{zt} R(z; A_\mu) x \frac{dz}{z} - \frac{1}{2\pi i} \int_{a-iR}^{a+iR} R(z; A_\mu) x \frac{dz}{z} . \end{aligned}$$

Next we show that for the integral,

$$(3.49) \quad I(R) = \frac{1}{2\pi i} \int_{a-iR}^{a+iR} R(z; A_\mu) x \frac{dz}{z}$$

it follows:

$$(3.50) \quad \lim_{R \rightarrow \infty} I(R) = 0 .$$

We consider Jordan's closed smooth curve,

$$(3.51) \quad \Gamma_R^2 = \Gamma_R^{2'} \cup \Gamma_R^{2''}$$

where,

$$(3.52) \quad \Gamma_R^{2'} = \{a + i\tau : \tau \in [-R, R]\}$$

and

$$(3.53) \quad \Gamma_R^{2''} = \left\{ a + R(\cos \varphi + i \sin \varphi) : \varphi \in \left[-\frac{\pi}{2}, \frac{\pi}{2} \right] \right\} .$$

From Cauchy's theorem we obtain:

$$(3.54) \quad I(R) = \frac{1}{2\pi i} \int_{\Gamma_R^2} R(z; A_\mu) x \frac{dz}{z} = 0$$

so that,

$$(3.55) \quad \frac{1}{2\pi i} \int_{\Gamma_R^{2'}} R(z; A_\mu) x \frac{dz}{z} + \frac{1}{2\pi i} \int_{\Gamma_R^{2''}} R(z; A_\mu) x \frac{dz}{z} = 0 .$$

Let $z \in \Gamma_R^{2''}$. It follows from Theorem 2.4 that there is a $C > 0$ such that,

$$(3.56) \quad \|R(z; A_\mu) x\| \leq \frac{C}{|z|} (\|x\| + \|Ax\|) .$$

Moreover, for $z \in \Gamma_R^{2''}$ we have:

$$\begin{aligned}
 (3.57) \quad |z| &= |a + R(\cos \varphi + i \sin \varphi)| = \\
 &= \left| a - [-R(\cos \varphi + i \sin \varphi)] \right| \geq |a - R| \geq R - a
 \end{aligned}$$

from where we deduce that:

$$(3.58) \quad \frac{1}{|z|} \leq \frac{1}{R - a} .$$

Consequently,

$$\begin{aligned}
 (3.59) \quad \left\| \frac{1}{2\pi i} \int_{\Gamma^2_R} R(z; A_\mu) x \frac{dz}{z} \right\| &\leq \frac{1}{2\pi} \int_{\Gamma^2_R} \|R(z; A_\mu)\| x \frac{|dz|}{|z|} \leq \frac{1}{2\pi} \int_{\Gamma^2_R} \frac{C}{|z|} (\|x\| + \|Ax\|) x \frac{|dz|}{|z|} \leq \\
 &\leq \frac{C}{2\pi} \frac{\|x\| + \|Ax\|}{(R - a)^2} \int_{\Gamma^2_R} |dz| = \frac{C}{2} \frac{R}{(R - a)^2} (\|x\| + \|Ax\|)
 \end{aligned}$$

from where it follows:

$$(3.60) \quad \lim_{R \rightarrow \infty} \frac{1}{2\pi i} \int_{\Gamma^2_R} R(z; A_\mu) x \frac{dz}{z} = 0 .$$

Then we have:

$$(3.61) \quad \lim_{R \rightarrow \infty} \frac{1}{2\pi i} \int_{\Gamma^2_R} R(z; A_\mu) x \frac{dz}{z} = 0$$

and

$$(3.62) \quad \lim_{R \rightarrow \infty} I(R) = 0 .$$

Therefore:

$$(3.63) \quad \int_0^t I_R(s) ds = \frac{1}{2\pi i} \int_{a-iR}^{a+iR} e^{zt} R(z; A_\mu) x \frac{dz}{z} .$$

Finally, using Corollary 2.6 and Theorem 2.5 it follows that:

$$\begin{aligned}
 (3.64) \quad \int_0^t T(s) x ds &= \lim_{\operatorname{Re} \mu \rightarrow \infty} \int_{a-i\infty}^{a+i\infty} e^{sA_\mu} x ds = \lim_{\operatorname{Re} \mu \rightarrow \infty} \frac{1}{2\pi i} \int_{a-i\infty}^{a+i\infty} e^{zt} R(z; A_\mu) x \frac{dz}{z} = \\
 &= \frac{1}{2\pi i} \int_{a-i\infty}^{a+i\infty} e^{zt} R(z; A) x \frac{dz}{z} .
 \end{aligned}$$

Since,

$$(3.65) \quad \lim_{\operatorname{Re} \mu \rightarrow \infty} \Omega = \lim_{\operatorname{Re} \mu \rightarrow \infty} \frac{\omega \operatorname{Re} \mu + \operatorname{Im}^2 \mu}{\operatorname{Re} \mu - \omega} = \omega,$$

the proof is complete.

Next, we prove the Bromwich's type representation theorem for C_0 - semigroups.

3.5. Theorem

Let A be the infinitesimal generator of a C_0 -semigroup $\{T(t)\}_{t \geq 0}$ and $a > \omega$. If $x \in D(A^2)$ then,

$$(3.66) \quad T(t)x = \frac{1}{2\pi i} \int_{a-i\infty}^{a+i\infty} e^{zt} R(z; A)x dz$$

and the integral on the right converges uniformly for t in bounded intervals.

Proof: If $x \in D(A^2)$, then $Ax \in D(A)$. Using Theorem 3.4, for every $a > \omega$ we find:

$$(3.67) \quad \int_0^t T(s)x ds = \frac{1}{2\pi i} \int_{a-i\infty}^{a+i\infty} e^{zt} R(z; A)x \frac{dz}{z}$$

from where it follows:

$$(3.68) \quad T(t)x - x = \frac{1}{2\pi i} \int_{a-i\infty}^{a+i\infty} e^{zt} R(z; A)x \frac{dz}{z}.$$

By the equality,

$$(3.69) \quad R(z; A)(zI - A) = I$$

one obtains:

$$(3.70) \quad \frac{1}{z} R(z; A)A = R(z; A) - \frac{1}{z} I$$

so that,

$$(3.71) \quad T(t)x - x = \frac{1}{2\pi i} \int_{a-i\infty}^{a+i\infty} e^{zt} R(z; A)x dz - \frac{1}{2\pi i} \int_{a-i\infty}^{a+i\infty} e^{zt} x \frac{dz}{z}.$$

But,

$$(3.72) \quad \frac{1}{2\pi i} \int_{a-i\infty}^{a+i\infty} e^{zt} x \frac{dz}{z} = x$$

uniform for t in bounded intervals and the proof is completed.

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COMMUNICATION RESEARCH THROUGH THE INTERNET: STRENGTHS AND BOUNDARIES

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ABSTRACT

In the past few years the Internet has become a popular research tool. The aim of this paper is to examine the use of the Internet up to now and its future use as a research tool in the field of communication research. Quantitative research methods, on-line surveys, online or email questionnaires are some of the ways that the Internet can be used as a research tool. As far as qualitative research is concerned, the Internet can play the role of the biggest international databank. The question to be examined in this paper is, if and how new research methods have affected the way that communication research is conducted. For example, do these methods set new standards in the way that communication research is conducted? Do they require the researcher to have the appropriate technical knowledge in order to conduct any research? How was the collection of data affected? What are the restrictions and boundaries of Internet research? The paper also refers to the critiques that were expressed for those new methods and tries to forecast how these methods are going to be used in the future.

Keywords: Communication Research; Qualitative; Quantitative; Internet.

1. INTRODUCTION

The Internet was developed in the late 1960s but its use became popular in the late 1980s. In 2000, “400 million people all over the world were connected to the internet” (Erisken, 2005). In 2003, the users of the Internet in the EU were 43.5% of the citizens of the member states (Garitaonandia, 2004). Almost all international organizations and companies provide their employees with access to the Internet. As Erisken (2005) mentions “only after 1991 Internet has become commercial and became accessible to the users....At the same time academics in European Universities started to use electronic mail”. Regardless of the type of computer-mediated communication one chooses to make use of, as Waskul (2005) points out “email and world wide web, list serves, on-line chat, interaction through digital cameras, the whole of these various expansive possibilities, the Internet is unquestionably a complex medium of communication”. All universities in the developed countries have their own web-pages and provide their students and members of staff with access to the Internet. In

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the past few years the Internet also became popular as a research tool. However, as Sourbati (2004) points out, “accessibility of electronic communications is merely a function of access to hardware and software”. Being within reach of a dial-tone telephone or an email does not necessary imply that one is contactable. As research into patterns of Internet use has demonstrated, service inclusiveness pertains to the ability of the user to understand and to engage”.

As Jones claims (1999), “the internet is an actuality, not just a technology”. Were it a technology alone, little about it would be of such general interest. The technical challenges that brought about its existence and the ones that spur its development would hold some interest. It is not the technical challenges but, rather, the social ones that become most interesting”. Levy (1995) sees cyberspace as a challenging potential for collective education, as a crucial mediator of the universal knowledge of humankind. According to Sudweeks and Simmoff (in Jones, 1999), “the Internet has given birth to new research fields or has diversified existing research fields connected with human activities”. Today young researchers ‘are more positive and willing in the use of the Internet as a research tool in contrast with the older ones that are more cautious in this perspective” (Mylona, 2003). The aim of this paper is to examine the use of the Internet up to now as well as its future use as a tool for research in communication. The paper explores the differences between qualitative and quantitative research methods by referring to their strengths and boundaries.

2. QUANTITATIVE RESEARCH METHODS THROUGH THE INTERNET

As Priest mentions (1996) “quantitative research methods simply put, use numbers”. In quantitative research methods, questionnaires seem to be one of the most popular ways of collecting data. Questionnaires also seem to be the most popular way for quantitative research through the Internet. Questionnaires could be used in two different ways for research through the Internet, either by sending the questionnaires to a selected sample population through email or by displaying the questionnaires on a site on the Internet (web-surveys).

The first way, i.e. sending the questionnaires to the sample using the email, means that the researcher can select the email address of his/her sample and send them the questionnaire. As Janeau claims (2000) there are criteria that the researcher should take into consideration before sending the questionnaire. These criteria are: a) the ability of the respondent to understand the questions and b) answer the questionnaire and the honesty and the credibility of the respondent in answering the questions. An email questionnaire is fast as the receiver can get the questionnaire seconds after the questionnaire was sent. As Reavy (2001) points out, “the advantage of the email questionnaires is speed, cost, convenience, flexibility, power and security and the negative points are those of access, equipment, education, language and geography”. Moreover, this new way of research is cheap as you do not have to pay for sending the

questionnaire by post. There are no time limits as the questionnaire can be sent any time of the day and the researcher is able to verify if the receiver has read the email. The fact that the sender does not know the receiver of the email causes some problems. The receiver of the questionnaire might not open the email or the attachment of the email as he/ she might be afraid of viruses. In a research conducted at the University of Leeds and Aristotle University of Thessaloniki, some of the sample of the study, i.e. academics of 10 departments of the above universities, did not reply to the emailed questionnaires. The reasons the academics gave for not replying were, as they themselves mentioned, that they did not know the sender, so they were afraid that the email might contain viruses. They also mentioned that they receive many emails everyday so they do not have the time to open and reply to them all (Mylona, 2003). Similar reactions were observed in a research that took place in 8 departments at the Hebrew University of Jerusalem in 1995. As Lazinger (1997) mentions, the academics that received the email questionnaire were cautious in replying to the questionnaire. As Witmer, et al. (in Jones, 1999) claim during a research that they conducted about the design and the use of email questionnaires, “the short version of the questionnaire would produce significantly higher response rates than the long version”.

Another type of questionnaire a researcher could use is the one displayed on a web site on the Internet. In this case, the visitor of the web page can complete the questionnaire if he or she wants. The web page counts the visitors of the page but also counts the number of those that complete the questionnaire. It should be mentioned though that a large amount of scholars criticise this way of collecting research data. Breiger (1999) characterizes those questionnaires “as 'social network questionnaires'” and he claims that “this way of collecting data substitutes issues of precision and credibility with those of interpretation, protection as well as management of our data”.

There are two different ways of completing close-ended questionnaires on the web, that of radio button and that of drop-down boxes. As Heepwegh and Loosveldt (2002) mention, by referring to the first type - that of radio button selecting - “one of the response categories to answer the question is achieved by clicking the associated radio button with the mouse pointer. When the respondent clicks a radio button, that element turns black, indicating that the associated response category has been selected as the answer to the question. If the respondent clicks another radio button, the former selection disappears and the newly selected radio button turns black”. The difference with the drop-down boxes is that drop-down boxes need to be operated slightly differently. “These input elements usually have a height of only one text line and hide the list of response options. When the respondent wishes to answer the question, he or she has to click the drop-down box. At that moment all response options become visible”. The respondent in this case can read the response alternatives and change his/her answers if he or she wants. In drop-down boxes the respondent can download his/her options faster than in radio buttons.

Concerning the on-line questionnaires, it should be mentioned that this kind of questionnaire should be short and the questions must be direct and clear. What Witmer et al. (in Jones, 1999) mention about the on-line questionnaire is that “an introductory paragraph with no forewarning to a full, on-line survey instrument is inadequate and inappropriate to the electronic environment”. Another issue that seems to be important in this type of research is the issue of accuracy. In the questionnaires placed on the Internet, the participant may complete the questionnaire more than one time if he /she wants. That means that the results of the research cannot be accurate.

This way of research seems to be more popular to international organizations and companies that include questionnaires on their web-sites and ask the visitors of the web-site to complete the questionnaires. The questionnaires are short, the questions demand a yes/no answer and the data that the company or the organization collects is limited. Ray Poynter (2000), manager of the company Millward Brown Intelliquest, claims that “big companies prefer this way of research as they have immediate results and they can quickly provide their clients with those results since processing of the results can be completed immediately”.

3. QUALITATIVE RESEARCH METHODS THROUGH THE INTERNET

According to Eysenbach and Wyatt (2002), electronic interviews and surveys can be seen as “emerging scientific research methodologies, pioneered by communication scientists, sociologists and psychologists”. What about qualitative communication research? Could such a research be successfully organized and conducted on-line?

As far as qualitative research is concerned, the Internet can play the role of the biggest international databank, a vast library with no walls that can be entered 24 hours per day, every day. The convenience of searching information from the familiar surrounding of one's office and/or house any time of the day, gives the researcher the opportunity to work late at night and/or weekends, combining perhaps this activity with other house or office-oriented activities, like work or family engagements. The Internet can account for an important means of data collection in qualitative communication research on certain occasions and if used accordingly.

Bibliographic research, the core of qualitative analysis, could be quicker and enriched through the use of digitized scientific content that is available on the Internet. In the framework of the eEurope initiative, many libraries are funded by specific programmes in order to digitize their content and offer it on-line, creating a common European library based on a common platform and interoperability challenges. Through deterritorialisation of knowledge, a meta-national research endeavour is performed more easily, as the researcher is freed from spatial or temporal bounds. The Internet can therefore be seen as a collector of data from all over the world and a distributor of this information to every PC in every part of the world. This scientific information flow can be seen as a vast opportunity to gather and expand the scientific

knowledge of humankind, as via the Internet any researcher, set anywhere in the world, regardless of the richness of the collection in his/her university library, can collect and study digitized content.

Convenience, verifiability, low-cost research and easy access are important aspects of Internet bibliographic research. Some databases provide valuable, up-to-date information and can help the researcher organize references. There are, however, certain limitations that a researcher should be aware of when conducting research through the Internet.

The credibility of the on-line content producer is an issue that has been widely discussed and examined in literature. Due to the fact that anyone with little technical knowledge can produce and offer to a wide audience content via the Internet, it is quite important to double-check the source of the information before taking it for granted or adopting it as existent or reliable.

Access issues have also been examined, as in many cases there are certain important obstacles between the researcher and the available content. There are researchers that still do not have the adequate knowledge, whether technical or scientific, to use the Internet as a tool for collecting bibliographic references or literature data. Others find it quite time-consuming or expensive. Time-consuming, as they might spend much time searching for content, especially if they have little knowledge using the search mechanisms provided. Expensive, as they have to pay the cost for the connection to the WWW via a modem. In some countries, including Greece, the connection to the Internet is still considered rather expensive, especially if one wishes to have an ADSL line for quicker downloading of content.

Restrictions on lending conditions still apply, as not all the collected digitized content can be read on the visitor's PC screen. The required software should be installed on the researcher's computer for him/her to be able to see the downloaded information on the screen. There may not be a restriction regarding working hours, but certain material can only be accessed by typing a pre-given password in a provided space. This password is often given through a certain subscription for the provided services.

Apart from bibliographic research, the most common qualitative research techniques include:

- Experience surveys
- Case studies
- In-depth interviews
- Focus groups
- Panels
- Projective techniques.

An experience survey cannot possibly be conducted via the Internet, as observation and participation of the researcher is required. In such surveys, the researcher questions knowledgeable individuals on the predefined hypothesis in

question. Computer-mediated information cannot stand for immediate experience. Case studies refer to the description and analysis of one or a few situations that are similar to the one studied. Case studies often include observation or content analysis. Similarly, the only way the Internet can be used by researchers wishing to conduct a case study is to collect information on a subject or a hypothesis. Pilot studies, however, can easily and successfully be conducted via the Internet.

The depth interview is used when a researcher wishes to explore a subject in detail. It might be audio or video-taped and it is usually taken by knowledgeable, very experienced or skilled individuals, as it aims to obtain a very detailed picture about the researched area of interest. Depth interviews could, under certain conditions and only when particular circumstances occur, be conducted via the Internet. The interviewer can meet the interviewee on-line and discuss the issue that is being researched. However, the depth interview requires the undivided attention of both participants and the relationship between them might bring up other aspects of the subject that were not considered of outmost importance when designing the research.

The idea of a focus group in qualitative research can be equaled to bringing together a group of people to explore certain issues that have been stated in advance by answering questions and encouraging the group to freely state their opinion and discuss the subject posed. There is, therefore, a certain interaction in traditional focus groups. Focus groups are characterized by the presence of a moderator and the stimulation of discussion among the participants, rather than an interview with individual members of the group. Can this interaction be generated and maintained when the participants are not physically present and only text on screens brings them in contact?

For many researchers, the idea of creating an on-line focus group seems rather appealing. The cost savings could be quite big in such cases. The traditional focus groups are difficult to organize and presuppose a given time limit. A certain location where people meet is required, as well as certain machines for recording and analyzing data. Someone should take notes. The participants' comments, body language, gestures or even silence should be noted. The on-line focus groups, as Kenny (2005) points out, prove convenient for both researchers and participants, providing "richly detailed research data". A certain location is not needed, as the participants can "log in" from any place at any time. They should only have a computer and access to the Internet. Time limits can be expanded in on-line focus groups.

The number of people that can participate in a focus group is also expanded when the research is conducted on-line. In traditional focus groups the participants do not usually exceed the number of six to twelve persons. More people can enter in on-line focus groups and answer to the pre-given questions or even pose new questions.

The participants in on-line focus groups have the ability to "log off" at any time, the time to reflect on the discussion made or clarify previous unclear points. The data

is automatically stored in the software used and can easily be examined by the researcher afterwards.

Murray (1997) has defined and studied the “virtual focus group”, but his understanding focuses on private e-mail discussions and does not consider actual interaction between the participants. Some software offer real time chat facilities or forums, where interaction between the participants can be easily observed.

The level of participation in on-line focus groups has been questioned. Not all the symbolic means of expression are available via the Internet, but on the other hand, even in traditional focus groups, not all the information that is expressed in means other than oral language is noticed and/or noted. In on-line focus groups the emphasis can be expressed by the use of capital letters or icons - and these comments cannot be overlooked by the researcher.

The environment of communication is not the natural one and issues of using false identities or withdrawing information on the Internet arise. In addition, not everyone can access information via the Internet. Some audiences therefore have limited opportunities to participate in on-line focus groups. Not all the participants in on-line focus groups are on-line at the same time. Anonymity is also an issue, as when on-line people can hide their identity or even adopt a second, different one for the purposes of the specific communication process.

When it is important to collect information on trends, researchers may decide to set up a panel of individuals which can be questioned over an extended period of time. For all the reasons mentioned above, such research can effectively be conducted through the Internet. As maintaining the panel can be both time-consuming and costly, the Internet can, through the mechanisms of forums or creating an on-line community, solve the problem.

4. COMMUNICATION RESEARCH ON-LINE

Fifty years elapsed since the creation of communication science in 2005. As McQuail mentions (1999) “under the name of communication science the field has been defined by Berger and Chaffee (1997) “as a science which seeks to understand the production, processing and effects of symbol and signal systems by developing testable theories, containing lawful generalisations, that explain phenomena associated with production, processing and effects. While this was presented as a *mainstream* definition to apply to most communication research, in fact it is very much biased towards one model of enquiry -the quantitative study of communicative behaviour and its causes”. As McQuail points out, however, Berger and Chaffee’s definition does not take under consideration the fact that qualitative study in the field of communications is also important and it should be included in any definition of communication science.

Qualitative methods (focus groups, observation, interviews, content analysis and bibliographic research) and quantitative methods (questionnaires, many kinds of personality testing, studies that count different themes in newspaper stories) were, and still are, used for communication research. What about communication research on-line? Is the Internet the future for communication research? Could such a task be successfully conducted through both qualitative and quantitative research methods?

Questionnaires can be sent cheap and fast to a large amount of people in order for them to express their views concerning issues of communication. The issue of access though limits the participant and questions the objectivity of the sample. As Waskul (2005) comments this kind of research does “not clarify understanding; it obscures it.....with few exceptions approaching the Internet directs attention to moral dynamics not communicative ones”. Participation is another important issue. As Witmer et al. (in Jones, 1999) point out “the lack of solid research in electronic surveys is no surprise”. The Internet can count as an important means of data collection for many news organizations and communication companies which can conduct on-line surveys. The fact that this kind of survey is cheap and fast and the results can be published immediately makes that way of collecting data popular for companies and organizations. The issue of access and the fact that one can participate more than once in such a survey, can make the credibility as well as the objectivity of the sample questionable.

Can depth interviews be used in the field of on-line research in communication? What is important in this case is that the participant should have all the relevant technology in order to participate in such an interview. Depth interviews could, under certain conditions and only when particular circumstances occur (i.e. the interviewee knows how to use the relevant technology), be conducted via the Internet. In communication science, however, the journalist or the researcher can conduct an interview with a limited sample. Under certain circumstances this seems to be a useful tool. For example, a journalist from Greece can conduct an interview with a British politician without having to travel to Britain.

Focus groups are one of the most important ways for collecting data in the field of communication. A certain interaction was provided in traditional focus groups. The researcher in traditional focus groups was able to meet the participants and provide them with all the relevant information. In the case of one-line focus groups, the number of people that can participate expanded, keeping in mind though that the participants have to be familiarised with Internet technologies. Time limits are expanded as well. Moreover, in the case of communication research, on-line focus groups do not allow the production of notes logging non-verbal behaviours such as nodding etc which might be of interest to the researchers. According to Schneider et al (2002), “the on-line participants were likely to have differed from the face-to-face participants in some demographic and personality characteristics”. As mentioned above, since only 43.5% of the citizens of the E.U. use the Internet, this way of

research in the field of communication automatically excluded those that do not have access (older people in most of the cases).

Bibliographic research can easily and effectively be conducted via the Internet. Digital resources are available via universities' libraries and other portals. The question is: which references are chosen to be digitized and therefore offered through the Internet to researchers all over the world? The researchers decide which content will be digitized and the researchers get the digitized content for teaching or for conducting further research. Nowadays, the E.U. funds digitization of content in order to preserve it and offer it to the widest possible audience. Digital libraries constantly increase and so is their content they offer—in all scientific fields of interest.

Many methodologies used in communication research can therefore successfully be applied via the Internet. As Couper (2000) notes, clearly, we stand on the threshold of a new era for survey research ... Whatever one's views about the likely future for survey research, the current impact of the Web on survey data collection is worthy of serious research attention. Tomasello (1997) found that the proportion of on-line communication research in 1997 was 4.8%. According to Gould (2004), in 2004 this proportion significantly exceeded that found by Tomasello. In fact, the rate was almost triple that of Tomasello's, meaning 11%.

Despite Gould's (2004) finding, that 11% of the research in 2003 was focused on on-line communication, the attention given to on-line research by researchers engaged in the communication field seems rather small. Many journals devote volumes to on-line communication but still, the particular research area is not adequately covered. Perhaps the appearance of new web journals, such as *Web Journal of Mass Communication Research* could inspire articles about or using on-line communication research, although in the particular journal such topics are not often published.

5. CONCLUSIONS

Technological possibilities are changing the dynamics and dimensions of research in the field of communication. The convenience of accessing data or conducting research without spatial or temporal restrictions is a matter a researcher cannot overlook. Vast potential research material is available on the Internet and can be displayed on one's PC monitor through a click. New opportunities for collecting data open up to the researcher. The PC monitor can be transformed into a "window through which the reader examines a potential stock of information" (Lévy, 1999). The collection of data via the Internet - whether through qualitative or quantitative methodologies - can cost less and save time. For a large part of researchers the Internet can be seen as the biggest database, since it collects and stores vast amounts of information. Through the delocalization of knowledge, a meta-national database could be created. By giving the researcher the opportunity to collect and study information

from every part of the globe, meta-national research endeavours can be conducted more often, easier, producing interesting results.

Of course, nobody can overlook the fact that there are some obstacles or problems related to on-line research in the field of communication. Issues of access, credibility of content and software use have widely been discussed among those researchers that tend to use the Internet as a research tool. In the case of conducting surveys, interviews or research via a focus group on-line, the limitation of the available symbolic forms of expression could affect the research outcome. Internet research has many restrictions and boundaries, as any other method of research. It has been extensively criticized by researchers that prefer using traditional, tested, approved and familiar methodology when conducting research.

Conducting research on-line sets new standards in the way that research is organized; it brings up new issues and requires from the researcher to have the appropriate technical knowledge in order to conduct any research through the Internet. The collection of data has certainly become quicker and easier, but a certain amount of attention is still required in order to perform any kind of research. Research through the Internet, however, is becoming popular, especially among young scholars and that fact alone could have many consequences in the future of communication research. Computer-mediated research in the field of communication requires specifically designed instruments in order to exploit the features of the electronic environment. Learning to use research tools via the Internet is something researchers should look into more closely. Computer and internet literacy seem to gradually become more and more essential among researchers and scientists.

As computer technology is rapidly expanding, it is necessary to consider the way in which it can be used to enhance knowledge acquisition. The challenge is to explore the concept further and question whether the Web really does offer a new frontier for communication research.

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FACTORS OF ENTREPRENEURIAL INNOVATION IN NEW TECHNOLOGIES IN THE NORTH AEGEAN REGION

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and THEODOROS IOSIFIDES^{***}

ABSTRACT

This research investigates the determinants for the development of innovative actions concerning informatics and new technologies for the North Aegean enterprises. The main aim is to highlight the 'attributes' of innovative enterprises, which make them different from the non-innovative. It is concluded that the important parameters for the development of innovative actions in new technologies as regards the North Aegean enterprises concerns the existence of outstanding resources and technological competence within the enterprise itself and also out of it, in the topic and peripheral environment. This view subverts the linear model and proves that the 'generation' of innovative actions expands beyond the infrastructure of the enterprises and towards a wider peripheral space.

Keywords: Innovation; Informatics; Enterprises; Northern Aegean.

1. INTRODUCTION

The need to boost competitiveness imposed by the single European market becomes more intense for the island regions and especially for the North Aegean Region, the least developed region on the external borders of the European Union.

Thus the development of innovative action is viewed as a decisive component of growth, since it contributes effectively to the opening-up of the regions, the maintenance of jobs, the appearance of new economic activities, the competitiveness and the solution of the problems that arise because of the nature of the area. In this research we adopt the following definition of innovation in information technology and telematics:

An enterprise is innovative when it creates or adopts a new product or process in information technology or telematics even if it has already been implemented by other enterprises.

➤ Within this definition, the “new idea – innovation” need not be invented by a member of the enterprise, neither to constitute a radical breakthrough. All that is necessary is for the idea to be new for the enterprise in the field of information technology or telematics.

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➤ Innovation cannot be imposed on the enterprise by external agents such as legal or regulatory proceedings. It must be adopted through a conscious decision making process.

Against this background, the aim of this research is to find out all the main factors of entrepreneurial innovation in new technologies.

2. RESEARCH METHODOLOGY

In this study we examine innovation in informatics and new technologies in the North Aegean region on a business level using a complex variable model. We examine the variables related to the innovative activity of enterprises in the sectors of informatics and new technologies, which are divided in the following categories:

1. *External variables:* We examine the connectivity and interaction of the enterprise with external sources of information such as the suppliers, the clients, the university, the competitors and the business advisers.

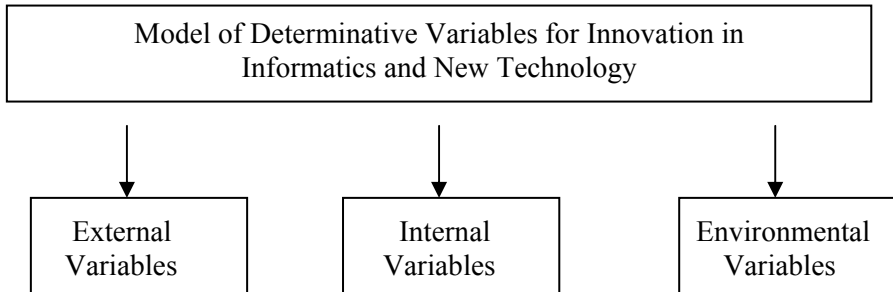
2. *Internal variables:* We examine the connectivity between innovations and the internal characteristics of the enterprise. We examine how the internal structure of the enterprise, (i.e. administration, personnel's training, experience, research) influence the decisions to create or adopt new ideas and programs in the sectors of informatics and new technologies, based on which the enterprise creates or adopts an innovation.

3. *Environmental variables:* We examine the variables related to the way in which the enterprise perceives and acts within an environment which is constantly alternating and demanding in matters of technology and knowledge and dictates technological dynamism, competitiveness as well as collaboration with other enterprises.

In this work we study a set of 77 variables. Each independent variable (i.e. research hypothesis) is validated, by examining its correlation with the degree of innovation (independent variables are examined by their effect on the dependent variable, innovation). The variable model appears below in figure 1.

In this research we chose to use a questionnaire in combination with interviews from a relatively large portion of enterprises in Lesbos, Chios and Samos. The questionnaire which has been used is structured and designed according to a conceptual model based on international literature and according to a series of questions which have been considered necessary for the validation of the research hypothesis.

**FIGURE 1: DETERMINATIVE VARIABLES FOR INNOVATION IN
INFORMATICS AND NEW TECHNOLOGIES**



The sampling technique we used was the snowball technique. The questionnaire was personally addressed to the manager of each enterprise and was completed during the interview. The questions were answered using a 5-point Likert scale. For the validation of the research hypothesis and the study of the factors which affect the innovative activity of the enterprise, we performed statistical processing using several statistical tests. We used descriptive and quantitative analysis using the ANOVA (ANalysis Of VAriance) statistical test, the Bivariate Analysis of all the independent variables towards the dependent variables and the stepwise multiple regression, which includes each one of the innovative measurements towards all the independent variables. Stepwise multiple regression is a method used to choose the predictors of a specific dependent variable based on statistical criteria. Multiple regression shows, in fact, the effect of several variables on a specific dependent variable, based on which the final model is determined.

3. DESCRIPTIVE ANALYSIS

The questionnaire was completed by 51 enterprises S.A. in the North Aegean Region, from a set of 271 enterprises S.A., divided in four categories according to the sector of their economic activity, i.e. in commercial, professional, industrial and tourist enterprises. The aggregated data of the sectorial comparison of the sample enterprises and population of the North Aegean Region appear in table 1.

The highest percentage of the enterprises which participated in the research is from the tourist sector (33,3%) followed by the professional, commercial and industrial sectors. 18,82% of the total population participated in the sample. This percentage is high enough to draw conclusions from the study of the sample for the whole population (Hair, 1995).

TABLE 1: COMPARISON ACCORDING TO THE SECTOR OF ECONOMIC ACTIVITY OF THE ENTERPRISES IN THE NORTH AEGEAN REGION

Sector of Economic Activity	N	(%) of Population	Lesvos (%)	Chios (%)	Samos (%)	Sample	(%) of the sample
Commercial	62	22,9	20,0	22,5	27,2	12	23,5
Professional	71	26,2	23,6	27,5	28,4	14	27,5
Industrial	98	36,1	38,2	41,2	28,4	8	15,7
Tourist	40	14,8	18,2	8,8	16,0	17	33,3
TOTAL	271	100,0	100,0	100,0	100,0	51	100,0

The research showed that 31 out of 51 enterprises, a percentage of 60,8%, stated that they are innovative. 30 enterprises stated process innovation and 5 enterprises stated product innovation. It is worth mentioning that 4 of the 5 enterprises which stated product innovation also stated process innovation (Table 2).

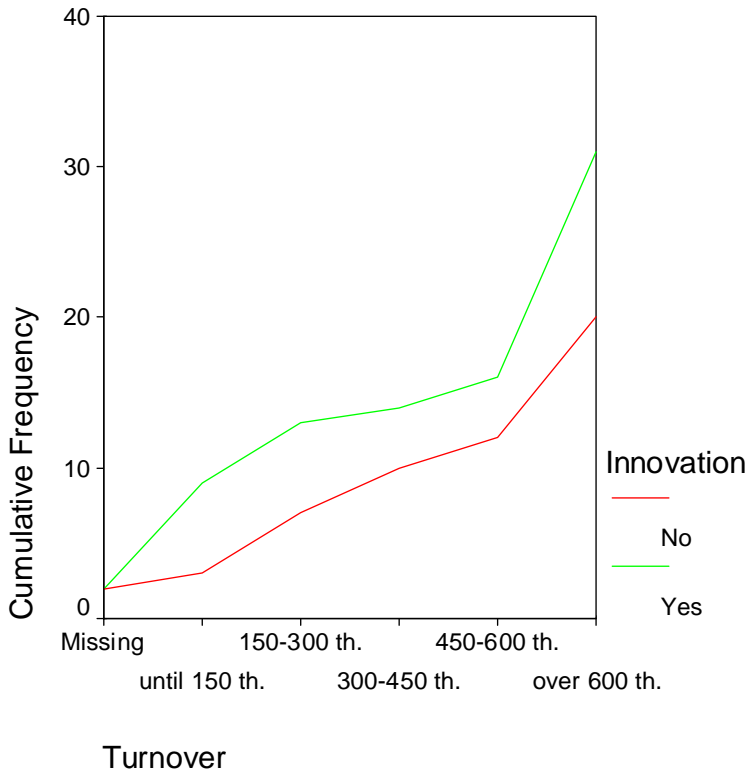
TABLE 2: PRODUCT INNOVATION AND PROCESS INNOVATION

			Process Innovation		Total
			No	Yes	
Product Innovation	No	Count	20	26	46
		% within Process Innovation	95,2%	86,7%	90,2%
	Yes	Count	1	4	5
		% within Process Innovation	4,8%	13,3%	9,8%
Total		Count	21	30	51
		% within Process Innovation	100,0%	100,0%	100,0%

Regarding the innovations distribution according to the sectors of economic activity, the ANOVA test did not show significant differences among them.

From figure 2 below, it becomes clear that the more the annual turnover of an enterprise increases, the more innovative it gets. This is concluded from the fact that the size of an enterprise positively affects innovation. This is also verified by other research conducted in Greece (Goudis, et.al. 2003).

FIGURE 2: TURNOVER AND INNOVATION



From the innovative enterprises, a smashing majority of 80,6% stated as the source of their innovation the administration of the enterprise and only 19,4% of the enterprises stated other sources. In particular, only 2 enterprises stated as the source of their innovation a local administrative entity (professional chamber, entrepreneurial associations, etc) (Table 3).

We draw important conclusions from table 4, which clearly shows that innovative enterprises use business consultants (often or very often) in a percentage of 48,4% compared with the 10% of the non-innovative enterprises.

The 58,8% of the enterprises replied that the local/regional and socio-cultural environment does not support innovation. This percentage reaches 80% in the case of non-innovative enterprises, while 54,9% of the innovative enterprises rated the local/regional environment highly (Table 5).

This means that a percentage of enterprises act “autonomously” without having any contact with their broader regional environment and this fact places them in a weaker position regarding their innovative activity.

TABLE 3: INNOVATION SOURCES

Innovation Sources	Yes	%	No	%	TOTAL
Administration	25	80,6	6	19,4	31
Personnel	8	25,8	23	74,2	31
Providers	6	19,4	25	80,6	31
Demand for specific products	5	16,1	26	83,9	31
Emergence of competitive products	3	9,7	28	90,3	31
Subsidies	5	16,1	26	83,9	31
Collaboration with other enterprises	4	12,9	27	87,1	31
Local administrative entities	2	6,5	29	93,5	31
Other sources	2	6,6	29	93,5	31

TABLE 4: INNOVATION AND INFORMATION EXCHANGE WITH BUSINESS CONSULTANTS

		Information exchange with business consultants					Total
		Not at all	Rarely	Sometimes	Often	Very Often	
Innovation	No						
	Count	8	5	5	2		20
	% within Innovation	40,0%	25,0%	25,0%	10,0%		100,0%
	% of Total	15,7%	9,8%	9,8%	3,9%		39,2%
	Yes						
	Count		6	10	8	7	31
Total	% within Innovation		19,4%	32,3%	25,8%	22,6%	100,0%
	% of Total		11,8%	19,6%	15,7%	13,7%	60,8%
	Count	8	11	15	10	7	51
	% within Innovation	15,7%	21,6%	29,4%	19,6%	13,7%	100,0%
	% of Total	15,7%	21,6%	29,4%	19,6%	13,7%	100,0%

4. QUANTITATIVE ANALYSIS

The quantitative analysis examines the correlation between the independent variables and the dependent variables “one to one”. At first we examine the correlation of the dependent variable “innovation” with each one of the dependent variables. The statistical test we use is the Pearson correlation coefficient. The correlation coefficient (r) is an index which measures the extent to which two variables are related to each other. It is measured in the range of -1 to 1. A correlation of +1 indicates a perfect positive relationship, i.e. as one goes up, the other goes up by the same amount or the other way round. We witnessed a strong connection between the following variables as shown in Table 6.

TABLE 5: INNOVATION AND THE REGIONAL ENVIRONMENT SUPPORTS INNOVATION

			Innovation		Total
			No	Yes	
The regional environment supports innovation	Not at all	Count	16	14	30
		% within Innovation	80,0%	45,2%	58,8%
		% of Total	31,4%	27,5%	58,8%
	Often	Count	1	11	12
		% within Innovation	5,0%	35,5%	23,5%
		% of Total	2,0%	21,6%	23,5%
	Very Often	Count	3	6	9
		% within Innovation	15,0%	19,4%	17,6%
		% of Total	5,9%	11,8%	17,6%
Total	Count	20	31	51	
	% within Innovation	100,0%	100,0%	100,0%	
	% of Total	39,2%	60,8%	100,0%	

TABLE 6: IMPORTANT CORRELATIONS BETWEEN THE INDEPENDENT VARIABLES AND THE DEPENDENT VARIABLE «INNOVATION»

Independent Variable	Pearson Correlation Innovation	Process Innovation	Product Innovation
Information exchange with business consultants	,563**	,499**	,330*
Use of electronic information sources	,519**	,433**	,348*
Adoption of new information systems	,453**	,436**	
Experience in the adoption of new technologies	,426**	,381**	
The regional environment supports innovation	,423**	,340*	,305*
Use of electronic commerce	,414**		,471**
Use of the Internet	,413**	,371**	
Online connection	,399**	,383**	
Keep informed of Computer Science news	,377**	,319*	
The enterprise does not take risks	-,366**	-,393**	
Discussion with providers	,365**	,299*	
Organization of meetings	,359**	,340*	
Exchange of ideas	,336**	,339*	
Information exchange with other enterprises	,326**	,310*	

Competition with an emphasis on informatics	,352*	,308*	
Adoption of new computing systems	,350*		,284*
Instant acceptance of new technologies	,336*	,330*	
Keep informed through exhibitions	,301*		
Faster introduction of informatics products compared with the competitors	,283*		
Constant research		,328*	
Encouraging the staff to decision making		,282*	
Clients' needs		,281*	
Discussion with clients			,314*
Technological environment in which the enterprise operates			,291*

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Then we used stepwise multiple regression for the selection of the predictors of the dependent variable “innovation” (Norusis, 2002). Our aim is to generate a functional model by using a set of independent variables with important prognostic value. We did not use all the independent variables but a subset of 19 variables which had a significant correlation coefficient of .01 and .05 with the dependent variable “innovation”. The results of the regression analysis appear in Table 7.

TABLE 7: REGRESSION ANALYSIS

Variables Entered/Removed^a

Model	Variables Entered	Variables Removed	Method
1	Information exchange with business consultants		Stepwise (Criteria: Probability-of-F-to-enter <= ,060, Probability-of-F-to-remove >= ,100).
2	The regional environment supports innovation		Stepwise (Criteria: Probability-of-F-to-enter <= ,060, Probability-of-F-to-remove >= ,100).
3	Adoption of new computing systems		Stepwise (Criteria: Probability-of-F-to-enter <= ,060, Probability-of-F-to-remove >= ,100).
4	Use of electronic information sources		Stepwise (Criteria: Probability-of-F-to-enter <= ,060, Probability-of-F-to-remove >= ,100).

a. Dependent Variable: Innovation

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Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,563 ^a	,317	,303	,514	,317	22,762	1	49	,000
2	,665 ^b	,442	,419	,470	,125	10,720	1	48	,002
3	,697 ^c	,486	,453	,456	,044	4,043	1	47	,050
4	,733 ^d	,538	,498	,437	,052	5,147	1	46	,028

- a. Predictors: (Constant), Information exchange with business consultants
- b. Predictors: (Constant), Information exchange with business consultants, The regional environment supports innovation
- c. Predictors: (Constant), Information exchange with business consultants, The regional environment supports innovation, Adoption of new computing systems
- d. Predictors: (Constant), Information exchange with business consultants, The regional environment supports innovation, Adoption of new computing systems, Use of electronic information sources

ANOVA^e

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6,020	1	6,020	22,762	,000 ^a
	Residual	12,960	49	,264		
	Total	18,980	50			
2	Regression	8,386	2	4,193	18,999	,000 ^b
	Residual	10,594	48	,221		
	Total	18,980	50			
3	Regression	9,226	3	3,075	14,817	,000 ^c
	Residual	9,755	47	,208		
	Total	18,980	50			
4	Regression	10,207	4	2,552	13,380	,000 ^d
	Residual	8,773	46	,191		
	Total	18,980	50			

- a. Predictors: (Constant), Information exchange with business consultants
- b. Predictors: (Constant), Information exchange with business consultants, The regional environment supports innovation
- c. Predictors: (Constant), Information exchange with business consultants, The regional environment supports innovation, Adoption of new computing systems
- d. Predictors: (Constant), Information exchange with business consultants, The regional environment supports innovation, Adoption of new computing systems, Use of electronic information sources
- e. Dependent Variable: Innovation

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Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-,116	,183		-,636	,528
	Information exchange with business consultants	,273	,057	,563	4,771	,000
2	(Constant)	-,356	,182		-1,951	,057
	Information exchange with business consultants	,251	,053	,517	4,756	,000
	The regional environment supports innovation	,127	,039	,356	3,274	,002
3	(Constant)	-,184	,197		-,936	,354
	Information exchange with business consultants	,361	,075	,745	4,812	,000
	The regional environment supports innovation	,151	,039	,425	3,834	,000
	Adoption of new computing systems	-,173	,086	-,324	-2,011	,050
4	(Constant)	-,222	,189		-1,173	,247
	Information exchange with business consultants	,321	,074	,662	4,332	,000
	The regional environment supports innovation	,136	,038	,382	3,534	,001
	Adoption of new computing systems	-,237	,087	-,444	-2,718	,009
	Use of electronic information sources	,130	,057	,306	2,269	,028

a. Dependent Variable: Innovation

Probability F for the introduction of a variable in an equation was increased from 0,05 to 0,06 in order to increase the prognostic value of the model. The regression model that we arrived at is the following:

$$\text{innovat} = -0,22 + 0,32 * \text{support} + 0,14 * \text{suppinno} - 0,24 * \text{adopt} + 0,13 * \text{elbaord}$$

where:

Innovat: innovation

Support: Information exchange with business consultants

Suppinno: the regional environment supports innovation

Adopt: degree of adoption of new computing systems

Elbaord: systematic use of electronic information sources

Thus, we draw the following conclusions:

1. There are 4 prognostic variables for innovation: the information exchange with business consultants, the support of the regional environment, the adoption of new computing systems and the use of electronic information sources.
2. The regression coefficient R^2 is, 538 and this shows that more than half of the variation of the entrepreneurial innovative activity is explained by the above regression model.
3. The negative sign for the 'adopt' variable is an object affected by the multicollinearity effects and is not such a reliable index of the direction of the correlation (Hair, 1995) as the bivariate coefficient which proved positive in Pearson analysis (.350*).

5. CONCLUSIONS FOR THE FINAL MODEL

From the final regression model for innovation we conclude that the use of business consultants in matters related to computer science and new technologies plays a decisive role. This is proof of the general prevalent climate which agrees with the basic results of the census concerning entrepreneurial innovation in the Greek state. The development of consulting centres, such as the BIC (Business Innovation Centers) and the IRC (Innovation Relay Centers) etc is of major importance. From the field research already conducted we conclude that innovation is pursued not only for its known benefits, but it increasingly constitutes an urgent need for the survival of enterprises and local financial development. The quest for knowledge, know-how and information constitute basic factors for the first stages of innovation development or adoption to begin. Thus, the use of business consultants in matters related to computer science becomes necessary.

The regional socio-cultural environment is also of decisive importance since it directly affects the whole progress of the enterprise. The support the enterprise can get from professional chambers, entrepreneurial associations, the University, the local government etc is very important. The next decisive factor concerns the adoption of new computing systems. The enterprise should "take risks" by adopting new computing systems and new technological techniques, because nowadays, it seems that those who truly belong to the world of informatics are only those who are at the peak of technology in product development and the other productive processes of the enterprise.

Innovative enterprises seem not to stick to what they have adopted once, but they move on, with an open mind, to find new methods which will give them a boost, giving them a significant advantage over their competitors. Their motive power is the administration of the enterprise which, according to our research, was the source of innovation with a percentage of 80,6%. There is a direct correlation between the above mentioned factor and the use of electronic information sources. A main factor for the development of an innovation of decisive importance is the information about new technologies and evolutions. The most appropriate way to achieve this is by direct electronic information through the Internet and other databases.

The above approach arrives at the conclusion that: technological innovations developed by enterprises in the N. Aegean region are a result of a set of complex interrelations among entities which carry (business consultants), support (regional environment), inform about (electronic information sources) and exploit (administration with open ideas and mentality) several forms of technological knowledge. In order to support the potential for innovations in a dynamic environment, the enterprise must have the possibility to renew the base of its knowledge. This approach integrates the innovative enterprise not only in a “technological network”, but also in a human network for the support – diffusion of technology and knowledge. All the above compose an innovation development mechanism which relates not only to the “capability” of the enterprise, but also to the whole environment in which the enterprise operates and evolves. Consequently, it would be required to set up a system which promotes the innovation environment.

It can be concluded that, in general, the key factors for the development of innovative activities in new technologies is the development of important resources and technological capacities not only inside the enterprise, but also in its direct environment. This aspect negates the Schumpeterian linear model, proving that the ‘genesis’ of innovative activities extends beyond the walls of the enterprise in a broader regional context. In a manifold environment, the possibilities to develop innovations are multiple. The results of this research support the ‘non-conventional’ or the ‘systemic approach’, according to which, *innovation is an organic element of society*. This school supports Morgan’s (1997) view that: a) innovation is an interactive process in a broad range of factors and that b) innovation is shaped by a variety of institutional routines and social conventions.

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IDENTITY-BASED TRUST IN ORGANIZATIONS: AN ENQUIRY

KIFLEMARIAM HAMDE*

ABSTRACT

Research has noted different answers to the question, “On what basis do individuals predicate trust in other organisational members”? Zucker (1986) points out the role of various institutionalization mechanisms in the production of trust. Burt and Knez (1995) focus on the role of social structures as contributors to the development and diffusion of trust among organisational members. Kramer (2001) highlights how an individual’s identification with an organisation enhances propensity to trust others in the organisation and willingness to engage in acts of trust when interacting with members. This paper explores the conceptual context of identity-based forms of trust associated with perceived hedonic consequences. The paper contributes to answering the question, “Why people join organisations or associations”? The author suggests that empirical research is required to validate the theoretical formulations on identity-based trust in the context of organisations.

Keywords: Associations; Identity-based trust; Institutionalization; Networks; Social Capital.

1. INTRODUCTION

1.1. What trust is and how it is produced, diffused and gets lost

The importance of trust within organizations has long been recognised but no explicit agreement could be found among researchers on what trust is or what it consists of. Robinson (1996) defines trust as a psychological state that encompasses individuals’ “expectations, assumptions, or beliefs about the likelihood that another’s future actions will be beneficial, favourable, or at least not detrimental to one’s interests”. Kramer (2001) supports what he calls an identity-based trust. According to him, trust is a function of organisational identification, and argues, “If members all identify with the organisation, then they are likely to trust one another even if there is no opportunity to test for evidence of others’ trustworthiness”. The question is if all individuals would identify with the organisation to the same degree or even to a

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higher degree. Kramer points to the degree of identification with respect to tokens and deviants whose identification is less than acceptable. "Being a deviant or token member of an organization can make one feel uncertain and in the limelight, which can cause one to have a fragile sense of trust for others, to actively distrust them or even to feel paranoid". Kramer's main contribution to the study of identity-based trust is his description of the "negative personal and organisational consequences of being a deviant or marginal member, as mediated by feelings of distrust and even paranoia".

Yet it can also be argued that 'feelings of distrust and even paranoia' may not always be the result of minimised identification. The central element on which several theorists agreed upon, however, was the assumption that trust has enhanced implications for the exchange of valuable resources among individuals (Zucker, 1986 and Robinson, 1996). Other social theory searchers also pointed out the advantages and disadvantages of high levels of trust (Coleman, 1990; Fukuyama, 1995 and Putnam, 1993), regarding trust as one of several - if not the main - elements of social capital. There has also been a considerable debate on how trust is produced in organisational contexts. On what basis can or do individuals can predicate trust in other organisational members? In the literature, three sources of answers can be identified.

In the following section, I shall first discuss three alternative explanations of the sources of trust: (a) institutional-based trust; (b) trust based on social structure and networks, and (c) identity-based trust. The main focus of the paper is on the latter view. Then, I shall describe how identity-based trust can be problematic when people take their identity as a *fixed* one. A different way of saying this is that people may form fixed understanding of themselves and others thereby also assuming fixed trust as people generalise about fixed interactions which may be limiting their actions in their own world. In order to get out of the fixed view of identity and trust, Watson's comparison of system-control view of identity and the process-relational view of identity are discussed. Based on these views, a research agenda is described where the empirical study is planned to be immigrant associations in Sweden. Two thematic hypotheses about fixed identity/trust, and ongoing form of identity and the corresponding form of trust will then be shortly presented. This more theoretical approach will be later on studied empirically.

2. THREE EXPLANATIONS OF TRUST

From the above short description, it can be assumed that three major sources of trust dominate the literature; I will shortly discuss them in the following sections.

2.1. Trust is produced through the institutionalization process

First, the institutionalists, for example, Zucker (1986) point to the role of various institutionalization mechanisms in the production of trust within organisations, such as structural arrangements and government regimes that contribute to the creation of trust. Basing the argument on the sociological perspective, Zucker holds that trust can be (a) process-based, (b) characteristic-based, and (c) institutional-based. The first two views on trust are embedded in the broader social fabric of a society and vary across communities and states, and within communities and states. For the process-based trust, it is the feature of reciprocity, which is at the heart of this process. As repeated interactions lead to long-term commitment, they lead to the security and stability of repeated reciprocal exchanges that enable learning and engender trust.

Characteristic-based trust is based on the norms of obligation and cooperation rooted in social similarity – “the expectation that a person can or cannot be trusted because of family background, age, social or financial position, ethnicity, and so forth. ... It may extend broadly within a society and may be reinforced by ritual a symbolic behaviours” (Creed and Miles, 1996). The institutional-based trust is tied to formal social structure, depending upon individual- or firm-specific attributes. Creed and Miles (1996) argue that increasing perceived similarities and the number of positive exchanges can influence trust.

2.2. Social structures create and sustain trust

Burt and Knez (1995) have focused on the role of social structures, such as network ties that play in the development and diffusion of trust among organisational members (Granovetter, 1985). According to Coleman (1990), it is dense networks that facilitate trust and norms by facilitating effective sanctions. Powell (1993) also argues that managing basically is a matter of governing the network created by continuous interactions, and this network can best be managed by creating and sustaining trust.

2.3. Identity-based trust

This view has mainly dominated the social psychological literature where identity is the preoccupation of some researchers, such as Kramer and Tyler. The two major ideas are uncertainty reduction and self-enhancement. Kramer (2001) locates the origin of trust among organizational members to a different source, identity, and argues that “Individuals identification with an organisation and its members enhances both their propensity to trust others in the organisation and their willingness to engage in acts of trust when interacting with members. Thus, individual’s awareness of a shared organisational identity fosters a form of presumptive trust in other organisational members” (p.168, highlights added). This is called identity-based trust.

Individuals' willingness to confer trust on other group members presumptively (i.e., with minimum evidence of their trustworthiness), along with the willingness to engage in acts of trust, can be understood as socially expressive actions that have social meaning and that lead to desired consequences. This is the same thing as to say, "Identity-based forms of trust are associated with perceived hedonic consequences". Thus, doing one's duty or fulfilling one's moral obligations in trust dilemma situations can lead to feelings of satisfaction and pleasure (Kramer, 2001). According to Kramer, there are a number of distinct cognitive, motivational, and affective processes that facilitate the emergence of presumptive trust among other organizational members.

However, it is difficult to determine the relation between trust and identity, which makes this approach rather diffuse. The limitation of this view is the problematic relationship between the concepts of identity and trust, individuals' mutual awareness of shared social identity and trust and support for each other: people tend to perceive other members of their 'in-group' in relatively positive terms (more cooperative, honest, trustworthy) compared to outsiders. It has also been found in social psychological studies that in-group members often expect more positive behaviour in their exchanges with other in-group members compared to out-group members (Kramer, 2001). The idea of identity-based trust is grounded on the assumption that in-group categorization processes influence how individuals perceive and judge other individuals within the group.

Kramer (2001) again holds that "individual's willingness to confer trust to another group members presumptively (i.e., with minimal evidence of their trustworthiness), along with the willingness to engage in acts of trust, can be understood as socially expressive actions that have social meaning and that lead to desired social consequences". As Simon (1991) holds that, "Identification with the "we" which may be a family, a company, a nation, or the local baseball team, allows individuals to experience satisfactions (to gain utility) from successes of the unit thus elected". Kramer adds that the "failures to do one's duty or violation of one's obligations can produce shame, guilt, and remorse" (ibid).

However, leaving the argument at this simple level would make it unidirectional. Do all group members presumptively trust each other to the same degree? Or do social and organisational identification apply to some but not others (Kramer, 2001)? Kramer (2001) holds that "individuals' degree of presumptive trust in others will correspond to their level of positive identification with the organisation and its members". Accordingly, Kramer (2001) holds that "individuals' level of psychological identification with a group or organisation reflects, presumably, the extent to which they maintain a positive "in-group stereotype" about the group or the organisation", and that such stereotyping generates trust in others. It is also the case that "identification with an organisation is likely to be related to individuals' beliefs regarding how readily they "fit" into the organisation and its culture". Thus, the psychological safety or security within the group or organisation leads to increased

trustful interactions among members. Particularly trust, acquires a “taken-for-granted” features by those individuals in the organisation whose identities are central and secure. As Brown (2001) holds, when identities are secure, trust recedes to the background of conscious awareness. Conversely, trust is difficult to emerge in situations where individuals lack a sense of security regarding their status or “fit” within group. Thus, Hogg & Mullin (1999) hold that people have a fundamental need to feel certain about their world and their place in it - subjective certainty renders existence meaning and thus gives one confidence about how to behave, and what to expect from the physical and social environment within which one finds oneself (p. 253). Hogg & Mullins (1999) also hold that “People do not strive for certainty about all aspects of life, but only those which are subjectively important” (p. 253), and that is done by social comparison. However, research also showed that “people prefer to make comparisons with similar rather than dissimilar others”. Upward downward social comparisons also lead to reducing uncertainty. Wills and Suls (1991), for example thought that upward comparisons may reduce uncertainty while downward comparison may satisfy self-enhancement and self-esteem motives.

Kramer (2001) argues that it is uncertainty, which lies behind the rise of trust, at least partly. ‘Uncertainty arises when we discover that we disagree in our beliefs, attitudes, feelings, and behaviours with “similar” others, where similar others can be defined as people whom we categorize as members of the same group as ourselves. Uncertainty is reduced when others agree with us, or when we can agree with others’ (Hogg & Mullins, 1999). Thus, Kramer (2001) defines social certainty within organisations as “organizational members’ subjective confidence and clarity (or lack of ambiguity) regarding their place in the social order of the organisation. Conversely, social uncertainty is “their lack of confidence and /or greater ambiguity regarding their place in that order” (p. 173). Kramer and Tyler (1996) add additional clarification by alluding to the expressed and unexpressed signals to individuals – perceived standing. By this Kramer and Tyler (1996) mean that the “information communicated to a person about his or her status within the organisation ... communicated both by interpersonal aspects of treatment – politeness and/or respect – and by the attention paid to a person as a full group member” (p. 148; quoted in Kramer, 2001, p. 173). Individuals attach greater importance to their status with social systems to the extent to which they are committed to reduce uncertainty and thus enhance their social standing.

Kramer (2001) also deals with the question of: “under what conditions do organisational members more likely experience social uncertainty in their organisational relations and dealings?” Salient multiple identification influences the behaviour of individuals within organisations. The salient social categories influence how individuals define themselves in a given situation. Individuals often categorize themselves, in terms of those attributes that happen to be distinctive or unique in a given setting (p. 175).

“Individuals who belong to distinctive social categories within organisations are more likely to be self-conscious when interacting with other organisational members, and especially when interacting with those from the (statistically) dominant group. Because they feel that they are different or “stand out” in the organisation, such individuals tend to overestimate the extent to which their behaviour is being noticed and that they are under a sort of judgemental or evaluative scrutiny by other group members” (Kramer, 2001).

Thus, self-categorization on the basis of distinctive or exceptional identity contributed to the perception of being under evaluative scrutiny. ‘Token members’ (Kanter, 1977), minorities exhibit such behaviour. According to Kanter (1997), “individuals who are members of token categories are likely to attract disproportionate attention from other organisational members, particularly those who enjoy dominant status in terms of their greater numerical proportion”.

The idea on the behaviour of token members was studied further by Taylor (1981) who posed that “observers often do allocate disproportionate amounts of attention to individuals who have token status in groups, especially when making attributions about group processes and outcomes”. Lord and Saenz (1985) also showed that token status affects the cognitive processes of tokens themselves. “Tokens feel the social pressure of imagined audience scrutiny, and may do so even when the ‘audience’ of the majority group members treat them no differently from no tokens” (p. 919). Kramer (2001) added the point that “individuals who have token status in a social system are more likely to experience higher levels of social uncertainty and in response, will be more self-conscious and perceive themselves to be under evaluative scrutiny to a greater extent than non-token members” (p. 177). “This may lead to overestimation of the extent to which they are the targets of others’ attention. This tendency to over perceive the extent to which people are paying attention to the self, has shown to foster a state of paranoid-like social suspicion and distrust of others” (Kramer, 2001). Most often tokens think and act in the shadow of doubt.

2.4. Uneasy trust in others

The conclusion of such studies is that trust is not equally experienced and lived by organisational members. Some organisational members can count on presumptive trust and thus increase their social certainty while others can only count, experience a kind of what Kramer calls a “fragile, tentative or uneasy sort of trust” (Kramer, 2001). Shortly put token and minority group members experience uneasy trust. Thus identity-linked forms of social uncertainty can adversely affect trust-related judgement and behaviour within organisations. Social uncertainty is said to lead to dysphonic self-consciousnesses. In contrast to identity-enhancing form of public attention, according to Kanter, dysphonic self-consciousnesses is an “aversive form of heightened public

self-consciousness characterized by the feeling that one is under intense social and evaluative scrutiny”, which is identity-threatening.

“When individuals become self-conscious, they look for reasons why they are self-conscious; if one is self-conscious, then someone must be watching. And if someone is watching him or her something might be amiss. One consequence of their self-consciousness, then, is that people are motivated to figure out what (or who) is causing it and what to do about it” (Kramer, 2001).

Hence, hyper vigilance and rumination contribute to several distinct modes of social misperception that can impede the development of presumptive trust, often leading to overly personalities, construal of social interactions.

3. IDENTITY-BASED TRUST: FIXED OR ONGOING?

Identity-base trust, however, is greatly affected by the view people have about identity, and in this final theoretical section, I will point out the implications of two vies on identity on trust: system-control and process-relational views on identity and thereby trust) as held by Watson (2002). According to Weigert et al. (1986), identity is the definition that transforms a mere biological individual into a human person. This social psychology view avoids the paradoxical view that existed between notions of personal identity and social identity. It is a definition that emerges from and is sustained by the cultural meanings of social relationships activated in interaction. “Identity is a asocial product which is bestowed on individuals by others and appropriated by individuals for themselves” (Thompson & McHugh, 2002). This takes a typified form of self, in that it is any of a number of self-produced categorisations out of what is available to the individual within the various situations in which they participate (ibid).

We constantly represent our subjective selves to others in our social environment. In the way we dress, speak and behave we present a changing image of, who we are to those with whom we interact: our identity is, in this sense, a negotiated construction. Depending on whom we are dealing with at the time, we can present an image, which is intended both to appear appropriate to the situation and to appear consistent with the expectations of the others. This view also conforms to the Erving Goffman’s view of identity within the dramaturgical metaphor (Symbolic interactionism) - representation of social identity being a performative metaphor to that of an actor.

The image presented is not necessarily the ‘real’ self of the person, but is a situationally appropriate image sustained both by the ‘actor’ and by those observing and/or interacting with the performer. The others involved collaborate with the actor to enable him or her to present a consistent performance and hence a social identity consistent with the situation.

The interface of social and personal identity lies in this act of interpersonal negotiation. A social identity does not simply spring fully formed from the demands of

the situation, but requires effort and practice from the individual and appropriate feedback from others. As for Thompson & McHugh (2002), the contexts from which we are able to construct a unique subjective identity for ourselves consists mainly of “rationalised” performances, and we construct our personal identity out of the strategies and responses we devise to deal with the situations we encounter. Thompson & McHugh (2002) further hold that the problem which people find in discovering their ‘own’ identity may in part arise from the consequences of trying to be consistent over time and from the wide range of images they have had to present to survive in a complex and changing social environment (ibid). Personal, subjective identity consists of the meanings and image we have found accurately to represent us in the past. Social identity, where it is different from personal identity, consists of the negotiated position between our personal identity and the meanings and images demanded of us in our current social context (Ibid, 2002). In this view, identity is the foundation of the links between social structure and personality and fundamental as such to the explanation of socialisation, motivation and psychological conflict. Our personal transactions with social structures are conducted for the most part through the organisations we belong to, work for and with which we have to deal. Organisations attempt to socialize people into their particular workplace cultures. Management attempts to influence individual motivation to its advantage. The amelioration of the psychological interpersonal and group conflicts engendered by these activities is a major rationale for the involvement of social and behavioural scientist in organisations. The above views help to conclude that identity is a linking concept between differing levels of explanation. People gain identities through interaction and association with others, but the major source of these interactions and associations with others are the social and cultural groupings to which we belong. These groups provide us with points of reference and comparison out of which we can define ourselves. Social groupings are in turn defined in terms of the social structure within which they exist. Through this route identity is directly moulded by social structure. Watson (2002) succinctly explains the dynamic nature of identity. According to him, identity is never fixed, and the classification of people by others is always in an ongoing the process.

The following table summarises his views of identity. The identity-based trust thus becomes itself a process that is never fixed. Watson (2002) calls the fixed view as system control view of identifies. The other view, where identity is considered to be in the process of becoming, he terms as process-relational view of identity.

The two views have ample implications for the way trust is understood, exercised and then sustained. If people have a fixed view on identity, then their trust will also be fixed and that any deviations from such a fixed view might lead to negative disidentification (animosity). In the process-relational view, trust cannot be distinguished from the processes of distrust as well, as these now become subject to the continuous interactions that negate absolute identification or absolute disidentification.

In the following two tables, I shall rather hypothesise how the system-control and process-relational view of identity might lead to corresponding views on trust.

TABLE 1: COMPARING THE SYSTEMS-CONTROL AND PROCESS-RELATIONAL VIEW OF THE INDIVIDUAL

Systems-Control View of the Individual	Process-Relational View of the Individual
1. The individual is a more or less fixed entity with a given personality	The individual is always in a process of becoming with an identity which is never finalised.
2. People are believed to enact the world. In the light of the language and understandings of their culture, the individuals actively make sense of the ambiguous world of which they are a part of, and then act in the light of these interpretations.	People perceive the world, which is external to them, and cognitively process the data which this perception inputs to the brain to enable the decision to be made about how to behave.
3. Actions take place, in the light of interpretations made about the world, to enact whatever projects individuals are undertaking strategically to shape their lives and to manage existential challenges.	It is assumed that behaviour occurs, in the light of data gathered, as the individual is motivated to fulfil needs and wants.

Source: Based on Watson (2002), pp. 105.

4. WHOM DO YOU TRUST AND WHY? A RESEARCH PROJECT

In this section, the sketch of the meaning of trust and its different implications are provided. First, trust in the system-control view of identity in the context of immigrant associations is described, followed by the meaning of trust and its implications in the process-relational view of individual, again in the context of immigrant associations. These implications are not empirically tested but they explain what it means for individuals to view trust in the respective approaches.

From a previous observation (Hamde, 2002a and 2002b), it can be held that immigrant associations have a fixed view of their ethnic belonging, and when forming an association, they emphasize the traditions, rituals, language, and discourse prevalent in their respective countries, and these are even taken not only to be true but also the best way of doing things. Moreover, many immigrant associations are formed to not only maintain identity but also transmit the identity to the posterity but no one knows whether the fixed views and ideas can be transmitted without any transformation.

This of course is an empirical question. This is to question the idea that identity-based trust itself can lead people to not changing according to the demands of the situation. Moreover, identity-based trust when applied to immigrant life and behaviour might lead to unnecessary comparison between the self and the 'other's', when the 'others' are born nationals with whom many immigrants try to associate less as they actively become immersed in their own traditional ways organising, rituals, and organisational principles.

Both the second column (on Trust) and third column (whom do you trust?) are based on column 1 of Table 1 to hypothesize or generalize views on trust in the context of immigrants associations. Yet, these have to be empirically studied in the future. Empirically, it has to be determined if and the extent to which members of immigrant organizations tend to trust more their co-members in contrast to non-members and for how long. An obvious answer to this depends on whether members have a fixed view of identity, and consequently generalize trust to each other a norm.

An alternative explanation is to study the extent to which members of an association have a dynamic rather than a fixed view of identity, thereby making trust to each other relative. In that case, the process-relational view of individual becomes much more promising and more realistic explanation.

I shall hypothesise how process-relational view of identity might be the basis for trust among and between people having a more dynamic view of both identity and trust. Table 3 below is an attempt to present that alternative, and I see that as an ongoing reflection of trust that is based on identity. The implications on trust are what I may call as *hypotheses* to be empirically studied in the future.

As a final reflection, I would like to raise the ambiguity of living in a changing world, especially for immigrants. Immigrant associations partly simplify the ambiguity for members, but in doing so, they may also lead to closure from the wider society in which many immigrants are formally associated while their hearts may still be governed by 'ethnic associations', norms, values, and principles of organising that may lead to fixed identity, and thereby fixed trust to self and fixed trust to the 'other'. If my paper tends to be more speculative to the reader, then I think I have partly succeeded to provoke ideas that may lead to more focus empirical investigations in the future.

TABLE 2: WHOM DO YOU TRUST? IMPLICATIONS OF SYSTEMS-CONTROL VIEW OF THE INDIVIDUAL IN THE CONTEXT OF IMMIGRANT ASSOCIATIONS

Systems-Control View of the Individual	What is Trust?	Whom do you Trust? (Context of immigrant associations)
1. The individual is a more or less fixed entity with a given personality.	The individual's trust on in-group is fixed. This fixation is based on fixed view of social capital.	People always trust those from their own country, and mainly associate with them'. Own culture, tradition and language constitute social capital that immigrants want to maintain' and develop as dimensions of 'Us' in contrast to 'Them'.
2. People perceive the world, which is external to them, and cognitively process the data which this perception inputs to the brain to enable the decision to be made about how to behave.	The form of trust is affected by the information received from the environment, and this trust is a fixed one. People generalise about the trustworthiness of the society around them.	Conception and processing of information about the world around them is selectively processed in terms of in-group and out-group information, while the in-group information is taken for granted as trustworthy.
3. It is assumed that behaviour occurs, in the light of data gathered, as the individual is motivated to fulfil needs and wants.	Trust is positively affected by the degree to which needs and wants are satisfied. It is negatively affected otherwise.	Needs and wants are defined in terms of in-group trust and out-group differences. Immigrant associations are formed in that assumption, regardless of whether they lead to satisfaction of needs or not. 'Trust is once for all'.

Source: Reformulation of Table 1 in terms of Trust.

TABLE 3: WHOM DO YOU TRUST? IMPLICATIONS OF THE PROCESS-RELATIONAL VIEW OF INDIVIDUAL IN THE CONTEXT OF IMMIGRANT ASSOCIATIONS

Process-relational view of individual	What is Trust?	Whom do you Trust? (Context of immigrant associations)
1. Individual is always in a process of becoming with an identity which is always emergent, never finalised.	Ongoing definition of identity leads to ongoing form of trust that is never fixated at a point.	Ongoing form of trust means trust cannot be governed only through traditions and rituals that people claim to have brought with them once for all. - No fixed social capital.
2. People are believed to enact the world. In the light of the language and understanding of their culture, the individuals actively make sense of the ambiguous world of which they are part of, and then act in the light of these interpretations.	Trust is loyalty to the changing interactions with many 'others', and is greatly affected by the formal association one is necessitated to form (labour market, etc).	Trust is a function of the degree of adaptation to the changing world but always in terms of changing 'we' and changing 'others'.
3. Actions take place, in the light of interpretations made about the world, to enact whatever projects individuals are undertaking strategically to shape their lives and to manage existential challenges.	Trusting actions involve not only satisfaction of needs and wants but also expectations about the future place one has in the society one finds lives in.	The answer depends not only upon who asks that question but also who the audiences are. Never trust once for all. Emerging multiple identities lead to emerging multiple sources of trust.

Source: Developed from Table 1 and Table 2 above.

5. CONCLUDING REMARKS

Based on a literature review, I have examined the question “on what basis do individuals predicate trust i” Three approaches to trust were revised, namely institutional-based trust, trust based on social structure and networks, and identity-based trust. The aim of the paper was to explore the conceptual context of identity-based forms of trust associated with perceived hedonic consequences. Examining fixed and dynamic views of identity did this. Both were hypothesised to have different implications to the extent to which individuals trust each other in the context of their

membership in organizations, specifically immigrant organizations. Both Tables 2 and 3 constitute the hypotheses that will be the basis on which empirical observations will be done in the future. The contribution of the paper lies in its enquiry by examining identity-based trust in both its dimensions - a fixed view and a dynamic view. In the normal situations, the fixed view is usually taken as the norm, with implications leading to conflict with 'other's and exclusion of non-members; however, in social life we know that the dynamic view is extended. That is, both identity and trust are changing, and it is seldom that identities and trust remain fixed forever. The paper contributes to answering the question why people join organisations or associations; yet the author suggests that empirical research is required to validate the theoretical formulations on identity-based trust in the context of organisations.

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ORGANISATIONAL CULTURE AS A FACTOR AFFECTING COMMUNICATION OF MARKETING AND SALES DEPARTMENTS

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ABSTRACT

This paper aims at answering the strategic question, “In which way do the values embedded in an organisational culture affect the forms of communication prevailing in an organization”? The paper also gives answers to the following secondary questions as well: “Does communication result in conflict or conflict resolution? What is the problem represented to be? What presuppositions underlie the conceptions concerning the communication process? What effects are produced by such representations? How are subjects constituted within the communication”? The questions were answered by employees who are in the organization’s Departments of Marketing and Sales as well as by employees who are at the different hierarchical levels of the organization.

Keywords: Communication; Culture; Inter-Organisational Communication; Organisation; Organisational Communication; Organisational Culture; Marketing; Sales.

1. INTRODUCTION

The objective of this paper is to present a topic of organisational culture as a factor affecting communication between different departments of an organisation. In summary, the view taken in this report is the following:

- (a) In every organisation a particular “organisational culture” prevails, in which particular values are embedded characterising the culture of the organisation.
- (b) The organisational culture is expressed in the forms of communication that prevail in the company
- (c) In each organisation the values and the forms of communication are combined in a unique “pattern” of communication.

The research focuses on the organisational culture prevailing in a multinational company and will examine:

- (a) How the members of the Marketing and Sales departments communicate with each other in order to achieve the company’s goals and how they view each other, and
- (b) Whether the pattern of communication can be modified in order to facilitate conflict resolution.

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2. THEORETICAL FRAMEWORK

2.1. Conceptualising the organisation

We shall discuss organisations from the point of view of institutional theory. According to Hall and Taylor (1996) three schools of thought in institutional theory can be distinguished:

1. Historical institutionalism, which defines organisations from a political economy point of view as “the formal or informal procedures, routines, norms and conventions embedded in the organisational structure of the polity” (Hall and Taylor, 1996)

2. Rational choice institutionalism, which defines organisations from an economic point of view postulating that actors (within an organisation) have a fixed set of preferences or tastes, behave instrumentally, so as to maximise the attainment of these preferences and do so in a highly strategic manner that presumes extensive calculation.

3. Sociological institutionalism, which stems from the sub-field of organisation theory and defines organisations broadly, to include, not just formal rules, procedures or norms, but, the symbol systems, cognitive scripts, and moral templates that provide the ‘frames of meaning’ guiding human action (Hall and Taylor, 1996). Sociological institutionalists have a distinctive understanding of the relationship between organisations and individual action, which follows the ‘cultural approach’. Furthermore, they also take a distinctive approach to the problem of explaining how institutional practices originate and change... arguing that organisations often adopt a new institutional practice, not because it advances the means- ends efficiency of an organisation or its participants but because it enhances the social legitimacy of the organisation or its participants” (Hall and Taylor, 1996).

Scott (2001) describes organisations as “multifaceted, durable social structures, made up of symbolic elements, social activities and material resources”. This view of the organisation from the perspective of sociological institutionalism seems to suit the purposes of this research.

2.2. Culture and organisational culture

According to Luthans and Hodgers (1989), culture is the acquired knowledge which people use to interpret experience and generate social behaviour. According to Hodgers and Luthans (1991) culture has the following characteristics:

- Culture is not inherited or biologically based; it is acquired by learning and experience;
- People as members of a group, organisation, or society share culture;
- Culture is cumulative and it passes from one generation to the next;

- Culture is the human capacity to symbolise or to use one thing to represent another; and
- Culture is structured and is integrated. Therefore a change in one part may bring changes in another.

Furthermore Hodgers and Luthans (1991) argue that culture also affects perception, that is, the process through which people receive, organise, and interpret incoming information, in other words a person's view of reality, and stereotypes that are the tendency to perceive another person as belonging to a specific category. There are different perceptions for: "how people view themselves, how they view others and how they believe others view them" (Hodgers and Luthans, 1991).

Dawson (1996) describes organisational culture as "shared values and beliefs, which characterise particular organisations". Luthans and Hodgers (1989) further refine the concept stating, "Organisational culture consists of the organisation's norms, beliefs, attitudes and values. Baumard (1994) argues that organisational culture can be also understood as a "tacit system of knowledge conversion and regulation and it is concerned with the organisational information systems". Furthermore, "culture consists of patterns, explicit and implicit, of and for behaviour acquired and transmitted by symbols, constituting the distinctive achievement of human groups, including their embodiment in artefact" (Kroeber and Kluckhohn, 1952). We may therefore conclude that organisational culture consists of shared norms, values, beliefs and attitudes. Organisational culture is (explicitly or implicitly) expressed in all communication processes and shapes patterns of behaviour and action within the organisation.

2.3. Communication and its forms

In this research, communication is defined as the flow of information in order to share the meaning (Bovee and Thill, 1992). Each organisation has its own approach to transmitting information throughout the organisation (Bovee and Thill, 1992). According to a categorisation presented by Bovee and Thill (1992) communication may assume the following forms: (a) verbal or written (b) formal or informal (c) top-down or bottom-up. These analytical categories should not be considered as mutually exclusive.

For example, in the everyday life of an organisation, verbal communication is used to discuss events or ideas and is used for sharing information on a day-to-day basis (Bovee and Thill, 1992) It can therefore be just as important as written communication (in the form of notes, memos, training manuals, newsletters, bulletin board announcements, or policy directives) which may also be used to prescribe a certain course of action.

Formal communication refers to the exchange of "official information that follows the chain of command "and may travel up, down or across the formal hierarchy"

(Bovee and Thill, 1992). Informal communication is the exchange of information “along the organisation’s unofficial lines of activity and paper” (Bovee and Thill, 1992). North (1990) argues that organisations function on the basis of both formal and informal constraints (rules vs. conventions and codes of conduct) that human beings devise to shape human interaction.

When information is transmitted from the top management to the departments, downwards, then the communication is characterised top-down (Bovee and Thill, 1992). Top-down communication may be verbal or written, formal or informal. For example it can be a causal conversation (verbal/informal), a formal interview between a supervisor and an individual (verbal/formal) a personal note (written/informal) or a departmental report (written/formal). There is also a need for the top management to receive information, bottom-up about the market, for emerging trends and for opportunities for improvement through reports in order to make intelligent decisions.

Communication is not always explicit and well structured. In order to communicate “we do not simply produce statements, questions and requests... a certain reaction by the other part is required as feedback” (Sifianou, 2001). Furthermore “features of context such as, who communicates with whom, why, when, where and how, contribute overt and covert information to the exchanges produced and have to be taken into account for the decoding of the intended message” (Sifianou, 2001). Therefore, a potent non-verbal aspect may be involved in a communication process. Non-verbal communication is usually less structured, more intense and spontaneous and has bigger impact and greater efficiency than verbal communication (Bovee and Thill, 1992). According to this view “if a person says one thing but transmits a conflicting message non-verbally, the non-verbal signal is believed”; motions and kinesis may overshadow the verbal message (Bovee and Thill, 1992).

Furthermore, Bovee and Thill, (1992), argue that “informally every employee accumulates facts and impressions that contribute to the organisation’s collective understanding of the outside world”. Hodgers and Luthans (1991) suggest that the “effectiveness of communication depends on the closeness of meaning that the sender and the receiver attribute to the message. Alternatively, perceptual communication barriers may appear”.

We concord with Bovee and Thill (1992) that communication requires perception, concentration and appreciation of the communication process. In order to communicate, a process is followed by the communicating parts. Through the communication process, “culture, knowledge, objectives, news and gossips pass among the organisation’s individuals” (Bovee and Thill, 1992). According to Bovee and Thill (1992) these activities belong to a chain of events that can be broken into five phases linking the sender to the receiver.

During the first step “the sender has an idea. These ideas are simplifications and abstractions of reality, filtered through the individual’s mind”. The second step is when “the idea becomes a message by transformation into words. It includes only the

information that is useful to the receiver, and it is organised in a way that encourages its acceptance. During the third step the message is transmitted physically. The channel used can be non-verbal or verbal, written or spoken and the medium used could be a report, a face-to-face exchange, a letter or a memo. The transmission channel and the medium used within that channel affect the content and reception of a message. The fourth step is the point when “the receiver gets the message. The last step is when the receiver reacts and gives feedback to the sender. That feedback is the receiver’s response because it permits the sender to evaluate the message’s effectiveness” (Bovee and Thill, 1992).

Combining the forms of communications and the steps taken within a communication process one may arrive at a pattern of communication (and possibly upon further elaboration of the theoretical framework to a typology of patterns of communication) that characterises an organisation and concords with the values embedded in its organisational culture.

2.4. The communication pattern between the marketing and sales department

Lancaster and Massingham (1988) define marketing as “the management process which identifies, anticipates and supplies customer requirements efficiently and profitably”. According to Strafford and Grant (1990) marketing management defines in which “way the business is oriented and is one of the vital factors that can make the difference between success and failure”. Marketing is concerned with a customer’s point of view, analyses who the customers are and what needs and desires they have and is concerned with planning how best to meet these requirements, given the sources and objectives of the organisation (Cooper, 1997).

Sales, as defined by Cooper is concerned with identifying the specific needs, desires and problems of individual customers and providing satisfaction of these in order to facilitate profitable business transactions. In other words the sales department, through its sales force, achieves the goal of completing the business transaction through understanding the needs, desires or problems of the potential customer and then demonstrating how the products of the organisation can match these needs (Cooper, 1997).

According to Lou Mazzante there is some overlap and a lot of duplicated efforts between Marketing and Sales Departments, but at the same time, there are areas that none of these departments handles. The Marketing and Sales Departments speak to the same customer, and they both want to meet the customers’ needs. Mazzante suggests that it is easy to put them in the same direction.

According to Cooper, Marketing holds a strategic management role and it is also concerned with a range of operational functions one of which is sales (Cooper, 1997). Marketing may take the strategic decision to use sales as a promotional tool. But “the marketing strategy needs to be communicated to the sales force and embedded in the

sales plan, which ensures that they are able to articulate it convincingly to customers” (Jobber and Lancaster, 1997).

As Kopp and Greyser (1987) suggest integration between the Marketing pull and Sales push programs is required. One of the most important determinants in the choice of promotional mix is the extent to which a company decides to concentrate its efforts in terms of its channels of distribution.

According to Jobber and Lancaster (1997) a push strategy is a marketing effort to push the product through distribution channels. The emphasis of the strategy is on ensuring that wholesalers and retailers stock the product through personal selling and trade promotion in the promotional mix. On the other hand a pull strategy relies heavily on advertising to promote the product to the final customer and the idea of this approach is based on the “notion that if sufficient consumer demand can be generated for a product this will result in end consumers asking the retailers for the product” who in turn create a demand to the wholesalers and finally to the producer.

The Sales Department’s task is to increase sales according to the company’s objectives through personal promotion of a product. The marketing department’s task is to increase sales with the use of a number of tools such as advertising, and other promotional activities. As we can see from the tasks that these two departments have, sales could be considered as the subset of marketing. The result of this relation has been described as a “war between Sales and Marketing Departments that has been waged for ever. It is a never-ending struggle for mutual respect and proper credit. Today, truce is necessary for corporate success” (Cohen, 1998).

The Marketing and Sales Departments are mutually depended, although sometimes distant. As Cohen (1998) suggests, sales meetings should include every member of the company’s Marketing Department, so that the sales people know that marketing people are involved in the sales process and the marketing people know how their ideas are implemented in order to comprehend that they are inter-linked and mutually dependent.

Given the above the specific objective of this research explores:

What organisational values prevail in a company and how these values help shape the organisational culture and the forms of communication between the Marketing and the Sales Departments. Have these values affected the pattern of communication between the two departments and how? Do they foster co-operation or competition?

3. METHODOLOGY

3.1. Research strategy

This study is an exploratory, qualitative research project. An interpretative approach will be assumed “combining the facts creatively in order to stimulate explanatory suggestions to the issue” (Remednyi, Williams, Money and Swartz,

1998). This approach seems particularly appropriate to the topic of the research since according to Fisher (2000) an interpretative approach can be used in order to determine the link between understanding and action, which is seen as indirect, mediated through people's thinking, values and relationships with each other".

3.2. Content analysis

The main method used in the research is content analysis. Billig (1987) argues that, in order to be "capable of understanding the meaning of a discourse in an argumentative context", the researcher should try to examine the words within that discourse, the thoughts in the speaker's mind at the moment of the communication and "the set of positions which are being criticised, or against which a justification is being compared. In the case that we have no knowledge of these positions, the argumentative meaning will be lost".

According to Sifianou (2001) "discourse" is the interaction between people in real social situations, and "mere knowledge of the meanings of words ...does not guarantee successful interaction, since actual communication is situated in particular socio-cultural contexts contributing significant information". These contexts involve specific individuals with specific life histories, values, beliefs and social standings in relation to others, "who usually enter interactions with specific intentions of what they want to convey". Sifianou (2001) adds that "the contexts also involve particular settings in terms of both space and time".

In order to overcome some of the limitations of traditional qualitative and quantitative methods, content analysis can be used (Kabanoff, 1996). Content analysis is a research method that uses a set of categorisation procedures for making valid and replicable inferences from data to their context. This method combines both qualitative aspects by defining the categories and quantitative aspects by determining numbers within categories that are exhaustive and mutually exclusive.

3.3. Research design

Semi-structured interviews, is the technique used for the present research. A small number of actors are chosen because the "bases of organisational processes can often be understood in terms of small group dynamics" (Sayles, 1980) which are analogous to interactions among larger components such as departments (Smith, 1973).

The focus is on these subgroups because the internal differentiation of organisations is characterised in terms of subgroups (Simon, 1965). Organisations may consist of integrated subgroups linked together (Simon, 1965), because subgroups are imposed on organisations for managerial efficiency (Granovetter, 1973), or because subgroups emerge as organisations grow and interactions among actors cannot be sustained at levels high enough to integrate each actor directly into the common

organisation (Robinson, 1981). Most relevant for us, subgroups may be areas of strong subcultures (Sackmann, 1992) within organisational culture.

4. DISCUSSION

The majority of the personnel working in the Marketing Department have undertaken relevant studies that finally assist them to enter the organisation, while the studies undertaken by the sales employees are irrelevant with their present occupation and did not assist them enter the organisation. One possible interpretation of this difference is that the Marketing Department employs people with relevant studies, while the Sales Department does not seem to have any similar practice.

The majority of the personnel working in both departments agreed that their studies are the major factor for understanding the organisation and that the organisation primarily relies on the experience that the personnel of both departments have gained through their work in the organisation.

The majority of the employees have the impression that they are working for a department, nor for a company as a whole. This may indicate that both department employees are operating in separation. One possible interpretation of this difference is that, as Hall and Taylor (1996) had stated that “the actors have preferences and behave so as to maximise the attainment of these preferences, they see politics as a series of collective action dilemma and the actors have strategically calculated behaviours and expectations”. The respondents answered according to the department they belonged to, where their actual interest is.

The marketing employees use the term “marketing orientation” meaning “open organisation”.

Furthermore, the employees of both departments believe that their company provides the necessary communication assistance, and, that their communication should be two way. So, both departments have realised that communication is very essential for the effective and efficient operations of the organisation, resulting in the development of inter-organisational channels of communication. Pacanowsky and O'Donnell-Trujillo (1982) argue that “organisational culture represents the distribution of information” and also take into account the duality of the communication. This indicates that the employees of both departments have been trained to the idea of communication.

There are differences, concerning the forms of communication between the departments. One of the basic features of most organisations is that actors influence one another through interaction, for example through face-to-face contact, as informal communication. Furthermore “features of context such as, who communicates with whom, why, when, where and how, contribute overt and covert information to the exchanges produced and have to be taken into account for the decoding of the

intended message” (Sifianou, 2001). Moreover, sales see formal communication as the only way of communication.

Furthermore, one more piece of evidence that enforces the finding retrieved above, is that while marketing argues that their job is to receive information about the market condition from sales, sales argues that their department is responsible to receive and use the tools that are produced by marketing.

There are non-significant differences between the two departments, concerning the way communication forms affect the efficiency of the departments, by resulting in confusion and misunderstanding, as each internal department has its own approach to transmitting information throughout the organisation (Bovee and Thill, 1992). Also, the prioritisation issue is important as one department is not aware of the information that the other department has (Macdonald, 1995) and proposes that it may not be wise to argue that departments pursue pieces of information to which they know others have, but they pursue the potential information that might be gained through an interaction. Furthermore, according to March and Shapira (1982), many organisations "gather more information and don't use it, ask for more and ignore it, make decisions first and look for more relevant information afterwards".

Since the flow of information is prioritised, and the priority protocols of the two departments are different the information sent i.e. from the Marketing to the Sales Department may be high in priority for that Department, but on the contrary may be low in priority for the Sales Department, which may lead to confusion and misunderstanding, since the Sales Department may need some other information that may be low in priority for the Marketing Department.

Concerning the cases where communication results in conflict between them, on the one hand, marketing argues that sales has their own codes of communication, and on the other hand sales argue that marketing has limited experience about real market situations.

One possible interpretation of this difference is that, since there are different priorities in communication, resulting in confusion and misunderstanding, those working in marketing cannot understand those working in sales and vice versa.

There are non-significant differences between the two departments, concerning the cases where communication results in conflict resolution between them.

It is very interesting to observe that there are significant differences in the view that the employees of the two departments have when asking for “time for real communication”. On the one hand, marketing argues that “time for real communication” can be achieved in the form of informal communication. The term “informal” contains the status of freedom and democracy. The aim of communicative planning is to empower groups, and to democratise the processes within which they may participate. In addition, Foucault (1992) states, "planning could be associated with the dominator power of systematic reason pursued through bureaucracies". On the other hand, sales do not suggest that “time for real communication” can be

realised. In bureaucratic organisations "learning is based on institutionalised experience and the organisation expects to continue, only more efficiently, the same behaviour that worked in the past" (Daft and Huber, 1987).

One possible interpretation is that the organisation has located that the existing conflicts, could be resolved through real "time for real communication". But, the search of "time for real communication" is not coordinated. Marketing searches informally and sales does not reveal their research.

In order to limit the communication problems between the two departments, communication requires perception, concentration and appreciation of the communication process (Bovee and Thill, 1992).

Since the problem with communication is obvious to the two departments and to the organisation, a new communication structure has to be developed. The choice of the communication structure depends on the communication imperfections to be considered. In other words, communication imperfections take the form that the message transmitted has a noisy component, making the interpretation of the message less accurate (Jahiel, 1999). Furthermore, Jahiel (1999) argues that an optimal communication structure coincides here with a structure that maximises the chance that no message is lost at every level of the communication process.

Marketing seems to be more sensitive to location problem maybe because, they are more carefully selected.

There are some significant differences between both departments, concerning the view that the different employee levels have about the organisation communication smoothness between the departments. According to Mazzante (2002) there is some overlap and a lot of duplicated efforts, while, at the same time, other areas are not covered. Simultaneously, both departments agree, that when communication lacks there is no cooperation, because, there are similar function situations within the two departments, which have been obvious to the employees. The awareness of this situation makes them agree that in cases of limited communication the cooperation is low as well.

There are some significant differences between the departments, concerning the organisation communication process assumptions. It is assumed that the communication between the departments is well established but, simultaneously, they agree that the language used is different.

One possible interpretation is that the employees do not blame the communication system but the other and vice versa. Deetz (1995) proposes that "open participatory democracy supersedes all other goals of communication. From a communication perspective, efficiency, effectiveness and information transfer cannot stand alone, but are interpreted within the promotion or demise of participation. Communication research is thus about the creation of more participatory communication practices and the critique and/or deconstruction of control processes. Therefore, the participate

ethics intrinsic to communicative processes provide a preferable foundation to that provided by any dominant group's interests”.

There are some non-significant differences between the departments, concerning the organisation communication results by agreeing that the communication process is good. According to Cooper, marketing holds a strategic management role and it is also concerned with a range of operational functions one of which is sales (Cooper, 1997). Marketing may take the strategic decision to use sales as a promotional tool. But “the marketing strategy needs to be communicated to the sales force and embedded in the sales plan, which ensures that they are able to articulate it convincingly to customers” (Jobber and Lancaster, 1997).

One possible interpretation is that, although, the communication between the two departments is very essential, they seem to be very happy about the result. This suggests that, communication is neither well-weighted nor taken into account seriously.

Concerning the view of the way the subjects are constituted within the communication of the organisation, marketing argues that sales does not have a common origin, while sales agrees with that view. Once more, sales, posits the view that marketing does not understand the market. Surprisingly, the top management and the low managers argue that marketing and sales should operate as one team. Mazzante (2002) suggests that it is easy to put them in the same direction since the departments speak to the same customer, and they both want to meet the customers’ needs.

One possible interpretation is that it is obvious to marketing as outsiders, and sales as insiders, that sales do not have a common background. This fact makes the coordination of the Sales Department more difficult, with respect to communication with the marketing aspects.

When asked whether there are significant differences between the Marketing and the Sales Departments, concerning the possibility of communication changes in the organisation, all of the respondents answered that the communication processes established in the organisation are very effective and therefore, no change is required. Simultaneously, half of the total sample of respondents who are equally distributed between the Marketing and the Sales Departments said that a communication seminar could be useful.

One should not forget that according to Argyle (1969) organisations as a function of communication can be defined as “... large social groups in which the leadership hierarchy and role-differentiation have become formalised into fixed ranks and offices, norms have become rules, and in which methods of communication and work are prescribed”.

One possible interpretation is that change is a taboo word. The idea of change, according to Kanter, Stein and Jick (1992) assumes that it “involves movement between some discrete and rather fixed ‘states’, so that organisational change is a

matter of being in state 1 at time 1 and state 2 at time 2". As proposed by Argyris (1977) organisational change through organisational learning is "a process of detecting and correcting errors". Furthermore, according to Amburgey and Rao (1996), the purpose of organisational change is nothing other than to improve the efficiency of an organisation.

Negroponte (2000), studied the relation between innovation, as a factor of change within a culture and sees "innovation as inefficient, undisciplined, contrarian, and iconoclastic, and it nourishes itself with confusion and contradiction. Yet without innovation we are doomed to decline". Furthermore, Negroponte (2000) suggests that "diversity is one of the basic components of a good innovation system. The more powerful a culture is, the less likely it is that it encourages the innovative thought. Rules and models of behaviours are enemies of new ideas".

When asked if there are differences concerning the possibility of communication issues that should remain unchanged in the organisation, all of the respondents answered that additional communication is needed. This suggests that combining the forms of communication and the steps taken within a communication process one may arrive at a pattern of communication that characterises an organisation and concords with the values embedded in its organisation culture.

According to Moorman (1995), there are four organisational information processes: (a) information acquisition, (b) information transmission, (c) conceptual utilisation, and (d) instrumental utilisation processes.

When asked if there are differences concerning the possible benefits for the organisation the Marketing Department employees answered that the Marketing Department will benefit, while the Sales Department employees answered that the Sales Department will benefit.

The Sales Department's task is to increase sales according to the company's objectives through personal promotion of a product. The Marketing Department's task is to increase sales with the use of a number of tools such as advertising, and other promotional activities. As we can see from the tasks that these two departments have, sales could be considered as the subset of marketing. The result of this relation has been described as a "war between Sales and Marketing Departments that has been waged for ever. It is a never-ending struggle for mutual respect and proper credit. Today, truce is necessary for corporate success" (Cohen, 1998).

The Marketing and Sales Departments are mutually dependent, although sometimes distant. As Cohen (1998) suggests, sales meetings should include every member of the company's Marketing Department, so that the sales people know that marketing people are involved in the sales process and the marketing people know how their ideas are implemented in order to comprehend that they are inter-linked and mutually dependent.

When asked if there are any differences concerning the view that the different employee level of the Marketing and Sales Departments have with respect to

communication smoothness of the organisation, all of the respondents answered that the communication follows a hierarchical order.

This suggests that the communication between the Departments of Marketing and Sales is preformed only through the top managers. Quirke (1995) argued that “the role of communication becomes not the top-down dissemination of management thinking, but the bottom-up means of connecting those who know what needs to change to those who have authority to make change happen”.

In parallel cases, the Marketing and Sales Departments are mutually dependent, although sometimes distant and the two departments have no real communication. As Cohen (1998) suggests, sales meetings should include every member of the company’s Marketing Department, so that the sales people know that marketing people are involved in the sales process and the marketing people know how their ideas are implemented in order to comprehend that they are inter-linked and mutually dependent.

5. CONCLUSIONS

The results of this study showed that there are differences in the level of education, understanding of the organisation, the organisational culture, organisational communication, the effects the organisational culture has on the communication between the Departments of Marketing and Sales, self-perception, the perception of the forms of communication developed within the company, perception on the way communication produces conflict or conflict resolution and on the sources of that problem, in the perception of the communication smoothness, of the communication process assumptions, of the results that representation produce, of the change in communication, of the same in communication, of the way to benefit, when comparing the Marketing to the Sales Department. However, there are also differences suggested in the perception of the one department with respect to the other and self-perception when comparing the two departments that deserves further study.

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CITIZEN RELATIONSHIP MANAGEMENT: THE CASE OF THE GREEK PUBLIC ADMINISTRATION

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ABSTRACT

The time of a new vision of government service delivery has arrived. This new vision includes the ability to deliver services to citizens effectively and efficiently in a manner that is tailored to their needs. Citizen Relationship Management (CiRM), the public sector CRM version, is a managerial concept that can contribute to this approach. CiRM and Citizen-centric approach are considered as fundamental enablers to the Operational Programme "Politeia" of the Greek Public Administration - an initiative of the Ministry of Interior, Public Administration and Decentralisation - which has already been in function, in order to overcome the "administration deficit" of the Greek public sector and to take out a lot of dysfunctions of the system. The aim of the Operational Program "POLITEIA" is the provision of quality services to the Citizen, adapted to the needs of individual groups of citizens, applying Citizen Relationship Management and exploiting technologies that allow to cope with more effective cooperation with the Public Administration in Greece. In general, we can say that the CiRM is used like a basic condition and a main tool for the successful rebuilt of the Greek Public Administration.

Keywords: Greece; Public Administration; Citizen Relationship Management; Citizen-Centric Approach; Quality Services; Exploiting Technologies; Effective Co-operation.

1. INTRODUCTION

Information Society Commissioner Erkki Liikanen, who spoke in Amsterdam on 17 January 2002, said that European governments need to rebuild public services around their customers. The architect of Europe's ambition to put government online by 2003 has argued politicians to rebuild public administrations from the bottom up.

In Greece, the reform and actual rebuilt of the Public Administration constitutes a strategic choice and priority of the Ministry of Interior, Public Administration and Decentralisation (MIPAD). This political decision stems from the profound recognition that the Public Administration forms, today, the most significant inhibiting factor to the economic and social progress of the country.

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The Operational Programme “POLITEIA”, an instrument of public politics, aims to rebuild Public Administration, in order to make it an institution that ensures development and social cohesion, and provides quality services to citizens.

The delivery of public services focused on the needs of citizens is one of the central aims of the Greek strategic programme for the modernisation of government. The ultimate aim is to ensure that public services are responsive to the needs of citizens and that public policy reflects the views and expectations of citizens. The emphasis is on giving citizens more choices about how, where and when they can access services and interact with public service providers. Otherwise, the Greek Public Administration intends to implement Citizen Relationship Management (CiRM), which is the application of CRM to the relationship between governments and the citizens to whom they deliver services. In both versions of CRM, the customer, or citizen, is treated as an individual who has a unique set of interests and needs and the right to customized, quick and convenient services.

In November 2001, Accenture, the international consulting firm, released a report entitled Customer Relationship Management - A Blueprint for Government. The report notes that governments are the largest service providers in the world and good Relationship Management in the public sector helps streamline services, improves inter-agency information sharing and provides self-service options to the public. In general, CRM principles are leading governments around the world to orient their service offerings around public needs instead of bureaucracy.

1.1. Problem definition

Several initiatives have been devised and implemented for improving the Greek Public Administration during the course of its historical evolution and formation. However, despite certain positive steps, an “administration deficit” remains, which is diffused into all individual sub-systems of Greek society. At the start of the twenty first century the Greek public administration continues to be characterised by widely known dysfunctions: the absence of strategic action, the wasteful maladministration of the scarce public resources, administrative flattening, the visibly poor work rate, organisational overlapping, not existence of rational planning regarding work positions, unsatisfactory service for citizens and so on.

A relevant study by the European Central Bank highlights the negative discrepancy between input-output in the Greek public administration. Corroborating this, a study by the World Bank identifies bureaucracy as the primary disincentive to attracting and establishing new companies. In particular, Greece ranks 125th of a total 132 countries for the number of procedures, and days required to establish a new company. Obviously, the rhythm of creating positions and boosting employment and the competitiveness of the Greek economy in general, is likewise affected. Similar conclusions are also reached by the competitiveness report of the Institute of

Management and Development, according to which the competitiveness of the Greek economy fell from the 46th in 2003, to the 49th position in 2004, pointing out that one of the causes has been the manner of organisation and functioning of the state.

As a result, reform of the state administration is considered essential to re-appraising the nature and mission of public administration institutions. In these historical times of globalization, the state is being restructured and this is a necessary strategic choice which responds persuasively to social requirements.

1.2. The existing State-Citizen Relationship in the Greek Public Sector – Necessity to rebuild public services

Nowadays, citizens regard Greek Public Administration negatively, a feeling which will be perpetuated if no radical changes are made in work practices. The Public Administration in its present form and with its present practices, breeds scepticism and insecurity in the citizens - recipients of its services. These feelings derive from its obscure nature and the corruption, plaguing the public administration, as well as from the low quality of services provided, which irritate the citizens who waste time and money in dealing with the public sector.

Upgrading the quality of services provided to citizens and enterprises is the core concern of the New Governance. This upgrading will be based on the opposition to bureaucracy and from the simplification of administrative procedures, the upgrading of the role of Citizen Service Centres (KEP) to “one stop services”, and will also be the result of a more general reform of the Public Administration.

The aims and values of the New Governance include the promotion of a relationship of confidence between the citizen-state and the institutions it represents, as a basic condition for the successful reconstruction of the Public Administration.

2. LITERATURE REVIEW

2.1. Citizen Relationship Management definitions

Citizen Relationship Management can be defined as a strategy, enabled by technology with a broad citizen focus, to maintain and to optimize relationships and encourage citizenship (Schellong, 2005).

CiRM is not about getting more information out of citizens, it is about providing timely, consistent and responsive access to government information and services by whatever channels citizens prefer (Coleman, 2004).

Other authors are more excited with CiRM and characterise it as the art and science of helping an organisation deal with its customers and constituents successfully (Miles, 2002).

Without a doubt, listening to the customers is the first step towards creating a

CiRM system that works (Bosworth, 2004). CiRM is a fundamental component of any Government strategy but it remains a component and not a complete solution (Gamlen, 2003).

2.2. Citizen Relationship Management Vs Customer Relationship Management

CiRM transfers the concepts of CRM to the specific conditions of public administration. The main aspect of this transfer is to understand the citizens as “clients” of public services. On the other hand, the citizens are not simply regarded as “clients”, because public administration offers its services as a monopolist at fixed administrative prices. Additionally, there is no clear definition of the “client” in public sense (Stuht, 2006).

Also, there is a difference according to the estimation of the importance of CRM for private enterprises and CiRM for public administration. The difference exists because of the special goals of CRM for companies, which cannot be easily transferred to the public administration, for example sales increase by an increase of the customer retention (Bauer, 2004).

The use of CRM in the public and private sectors is similar in two ways. They both use the same underlying technology and principles, and they both use CRM to help improve customer care. The big difference between both sectors can often lie in the way in which each regards the customer (Bohl, 2004), as it was recommended previously by another author. In the private sector CRM is used to manage a large number of customers, using a small number of processes, to maximise a small number of products and services. On the contrary, in the public sector CiRM is used to serve a large number of citizens, using a small number of processes, to maximise a large number of products and services. In the public sector, each customer is valued equally and the goal is to provide each customer with a service tailored to his or her needs (Bohl, 2004).

CiRM borrows heavily from CRM, but CiRM focuses on “serving” than “selling”. Both, CiRM and CRM are premised on the fact that in order to obtain best results, there has to be identification, differentiation, interaction and personalisation (Barquin, 2004).

Both private and public sector CRM emphasise the “Cs” at the centre of their mission. While constituents do not go to shop with another government, especially when they are anxious about security, legal, tax and financial issues, they can vote (Miles, 2002).

2.3. Citizen Relationship Management: case studies of other countries' approaches

In Australia, the government's service delivery system is called Centerlink. It delivers 140 products and services on behalf of 25 client agencies (Ross, 2004).

Centerlink has more than 1.000 services delivery points across Australia. Centerlink has a number of initiatives underway that allow it to respond in an increasingly sophisticated way to the needs, expectations and preferences of its customers. The most important initiative of Centralink is the Multi-purpose Contact (MPC) approach, which has been introduced as a means of ensuring a high quality service level and minimizing the possibility of unsatisfied customers, by collecting information and making use of it for multiple purposes.

In Singapore, government is probably the biggest service provider within the country and it is their commitment to place customers at the centre of their focus, as their vision and priority to reach out is the core of CiRM (Loo and Cheong, 2004). The Singapore e-Government Action Plan II, which was launched in July 2003, highlighted “Delighting Customers” as one of its key outcomes. Superior service delivery is a key strategic imperative. By July 2004, one of the initiatives addressing to businesses, is a one-stop shop that meets all licensing needs. A businessman is able to check the licenses needed, apply and pay for them online.

The government of Canada, recognizing the importance of CRM, has identified key stakeholders, whose role is to set priorities for service delivery, provide strategic thinking, ensure awareness of government programmes and support government strategies and initiatives. Another aspect of this whole-of government approach involves the development of relationships with other government organisations. These partnerships provide a framework for sharing ideas and experiences.

Besides, cooperation within government also leads to greater efficiencies in service delivery. The government of Canada created Publiservice, an intranet site that helps respond to employee needs. The site promotes an informed and engaged public service by providing reference tools as well as information about training, speeches, policies and publications that are of special interest to public service employees. Stakeholders, partners and employees, though focused on the needs of citizens, all play a crucial role in CRM (Public Access Programs Branch, 2004).

In 2005, for the fifth year in a row, Accenture has ranked Canada first in eGovernment implementation. The explanation is very simple: The Canadian government’s focus has been on what citizens actually want and not what the government thinks they want (Riley, 2005).

The government of Austria has used many approaches to improve the interaction with citizens. For example, survey tools have been used to find out citizens’ wishes, while Vienna provides multi-channel service delivery to enable access to all citizens. Front-end devices such as PCs, mobile phones and one-stop shops are offered, as well as public terminals for those citizens who do not have internet access at home. The evolution of online services is being taken to Vienna’s CiRM. Two initiatives involving CiRM efforts are: Vienna Citizens’ Request Management (vCiRM) and the Electronic Democracy European Network (EDEN). The vCiRM is a cross-departmental system of referencing and handling requests, complaints and suggestions

from the local community. The aim of EDEN Project is to enable true bi-directional communication between citizens and government staff. The goal of EDEN project, funded by the European Union, is to improve the communication between government and citizens in the decision – making processes, managing to stimulate and support citizens (Rainer, 2004).

In UK the CiRM National Programme is one of the 24 National Projects funded by the Office of the Deputy Prime Minister (ODPM) to help councils deliver better services and meet joined-up e-Government targets. These National Projects help councils to provide citizens with better access to local government services and in special CiRM Programme enables councils to understand, to anticipate and manage the current and future service needs of citizens (Devin, 2004).

The ODPM produced a three-stage “CiRM Strategy Framework” to support the CiRM Pathfinder projects in 2001. The stages were: “improving accessibility of services”, “transforming a department-based organisation into a customer-centric one”, and “delivering innovation in services”. The focus is on rapid resolution of enquiries and on satisfied customers (King, 2005).

The report of the UK experience makes clear that many authorities have made real progress and too many projects are tactical and carried out to meet deadlines, not strategies. The report carries a simple but important message – CiRM and E-Government are not ends in and of themselves, but rather key enablers that can help authorities meet fundamental needs (Hewson Group, 2004).

3. OPERATIONAL PROGRAMME “POLITEIA”- THE REBUILT OF PUBLIC ADMINISTRATION (2005-2007) – INITIATIVE OF THE MINISTRY OF INTERIOR, PUBLIC ADMINISTRATION AND DECENTRALISATION

As it has been already underlined, the Operational Programme “Politeia” constitutes an initiative of the Ministry of Interior, Public Administration and Decentralisation of Greece (Secretarial General of Public Administration and E-Governance, 2005). A special part of this programme, concerns the citizen-centric approach.

3.1. Citizen - centric strategy: development of Service Delivery System for citizens and enterprises

The citizen-centric approach for the Greek public services system means a shift from the introverted administrative environment to an outward-looking modern environment, directing itself towards the citizens, the enterprises and the society.

It aims at the provision of quality services to the Citizen, adapted to the needs of individual citizen groups. The exploitation of technologies can make it possible to have a more effective cooperation between the Public Administration services, so the

services provided can be upgraded and procedures can be simplified or facilitated. At the same time, the participation of citizens and financial agents is required, so that the possibility of using new electronic services can be exploited.

The aim of this Sub-program, which forms the first part of the operational program “POLITEIA” with two years (2005-2007) duration of implementation, is to create appropriate conditions for switching from the present operational model to a model which will perceive and satisfy the needs of citizens and enterprises, and will rebuild the relations between state and citizens, creating a climate of security and confidence. In particular, Sub-program 1 aims at the implementation of new methods for the service of Citizens and Enterprises, so as to make the Public Administration capable of providing high-quality services, similar to those offered by the private sector to its clients.

The Basic Aims of Sub-program 1, according the study of the Ministry, are categorized as follows:

- Quality Improvement of Public Administration Services offered to Citizens and Enterprises, so that they can become faster, simpler and friendlier.
- Rehabilitation of the relationship between the state and citizen/enterprise.
- Enhancement of equality and impartiality in dealing with citizens but also expansion of information and service in issues of Equality of Sexes.
- Qualitative improvement of services provided to special population groups.
- Abolition-amendment of provisions creating problems in the relations between State-citizen/enterprise.

Today, citizens are serviced by public services on the one hand and on the other, by Citizen Service Centres (KEP). The electronic services provided are mainly directed towards the information of citizens and enterprises. The increasing service demands of citizens and enterprises create the need for further standardization and incorporation of new administrative procedures into the Citizen Service Centres, but also the need for direct service by Public Services themselves. At the same time, through the operational programs of the 3rd CSF, more and more entities acquire the necessary infrastructures for the provision of electronic and fully automated services.

Moreover, by virtue of article 8 of Law 3242/2004 the Completed Administrative Operations were institutionalized. According to the stipulations of this Article, the competent service for the issue of the final deed undertakes to confirm real events, data or other legitimate relations (in collaboration with other competent public services) with the use of electronic media and particularly, of advanced information systems of interoperability.

Based on the existing situation, an emphasis is given to the development of self-service facilities, without the intervention of employees, by electronic services, ATM

machines etc.) Moreover, the role of KEP is reinforced, and additional administrative procedures are incorporated, standardized and certified into these, giving an emphasis, among others, to local special needs. Finally, the possibilities granted by the recently amended institutional framework will be utilized for the self-appointed search of supporting documents by public services.

3.2. Processes to develop a citizen - centric public services

Concerning the study of the Ministry, in Greece:

- The Public Administration must employ multiple processes and communication channels for citizens and enterprises.
- Citizens and enterprises must have the right to select the way by which they will approach administration.
- Citizens and enterprises must be able to contact experts (civil servants), who can give real information and can undertake any administrative procedures required for that service.
- Citizens and enterprises must have personal contact with administration and they must know with whom they communicate.

In order to apply all of them, a lot of processes have already been in function, like the following:

- **Development of automated services** for citizens and enterprises without employee intervention.
- **Development of telephone services.**
- **Improvement and development of services by Citizen Service Centres (KEPs).** KEPs form a modern network of distribution of administrative information and services. Moreover, KEP can be the potential contact point for citizens for all their transactions with the Public Administration.
- **Development of one - stop government** which gives the citizen the chance to handle all government services via his or her preferred channels and without the need to approach different civil servants of various authorities.

One-stop government has a lot in common with the concept of collaborative CRM of the private sector, which tries to optimize the communication with the customers over different channels (Schellong, 2004).

Users want one-stop access without having to go from Web site to Web site and from one service point to another one (Matthews, 2000).

Development of one-stop services provided by Public Authorities means completed transactions that can make citizens and enterprises be fully satisfied by the competent public service for the issue of the final administrative deed – service without the requirement of their presence. This category involves actions, like re-designing of public records, publications, application forms, and information search automation, so that completed administrative transactions can be created as provided by article 8 of Law 3242/2004.

The basic steps to develop these four processes are:

- Connection of existing infrastructures with self-service systems or tools.
- Incorporation of new automated services.
- Re-design of public entities' electronic websites and their enrichment with automatic services.
- Organisation of administrative information of State Organisations and their incorporation into the existing telephonic information and service systems.
- The planning and organization of these services must cover the open standards requirements, so that they can be utilized by other agents or future contractors involved in establishing service and information telephonic centres.
- Promotion and incorporation of new telephonic services.
- Re-modelling of the communication methods between Public Services involved in one administrative procedure.
- Citizen services information projects and operation of KEP and public services, aiming at the increase of public attendance and at the general reform of the citizens' relations with the Public Administration.

3.3. Citizens' clustering - service of specific groups of citizens

Service clusters are created in order to make it easier for citizens to find and access the programs and services that they require. Service clustering can be built around one service delivery channel (e.g. the 1-800-0 Canada call centre), or it can involve a number of channels. Service clusters can be organised around specific demographic groups, subjects (e.g. the environment), life-events (e.g. finding a job), organisations and policy priorities (e.g. Business, youth) (ICCS -Institute for Citizen-Centred Service, 2002).

In the Greek Public Administration, service clustering concerns sensitive population groups (citizens' clustering), i.e. groups who do not have the same opportunities with other citizens due to particular causes. Such groups are People with Special Needs, as well as specific citizen-population groups who experience difficulty dealing with the Greek language (i.e. European citizens, economic immigrants, returned emigrants and Roma) or Public Administration access problems.

This measure to service specific Groups of Citizens is mainly focused on issues such as the best provision of public services, equalling of access to information, and participation in public affairs.

In particular, this citizens' clustering has the following aims:

- To improve service to people with special needs, providing alternative methods for traditional and electronic access to the services provided by the public administration.
- To facilitate and guide people with special needs in their dealings with the administration.
- To improve service for isolated areas residents.
- To improve the service for specific category users who have problems with using the Greek language.

Citizens' Clustering can be sub-divided into individual categories, which are the following:

- **Service for People with Special Needs**

It is obvious that people with special needs have problems in accessing and communicating with public services. In a well-governed country, such as Greece, public administration is obliged to facilitate this citizen category and to ensure equal access rights for them, just as for other population groups.

- **Service for isolated areas residents**

Greece, due to its terrain, has mountainous or island regions whose residents have access and communication problems with the Public Services. While this problem has been alleviated with the creation of KEP, new projects and applications are budgeted in the framework of this category of actions which facilitate the transactions of residents of isolated areas with the Public Administration.

- **Creation of specialised services for categories of citizens who have problems using the Greek language**

Specific categories of citizens, such as European citizens, economic immigrants, returned emigrants, Roma etc. have specialised needs and Public Administration is obliged to meet these special needs. Servicing of this citizen category can be done either in local level or in central level per political sector (eg. transactions of these citizen categories with Public Administration on issues of Health, Education etc.).

3.4. Overcoming Administrative Obstacles (Cut Red Tape) and re-engineering administrative procedures

The aim of this measure is to improve the effectiveness and efficiency of internal operations of Public Administration entities, as well as the services provided to citizens and enterprises.

This measure has the following aims:

- To evaluate the existing institutional framework, in order to detect administrative and legal restrictions no longer necessary and as a result to carefully plan their abolition.
- To eliminate or reduce the expenses charged to enterprises and citizens encountered when informing the Administration about the observance of administrative regulations.
- To put in progress the implementation of self-certification and to reduce the number of certificates.
- To codify the legislation for specific groups of users.
- To identify complex administrative procedures and to re-engineer them, so that measurable benefits can arise in the quality, speed and cost of processing.
- To re-engineer and simplify administrative forms and series of actions in the course of processing administrative cases.

To achieve these aims the identification and re-examination of provisions proved by experience should be outdated or require change. Basic step towards this direction are the following:

- **Simplification of legal system**

In the framework of the present Action certain actions are included regarding the codification of the existing legal and regulative framework, governing selected operations by Public Administration entities, the reconsideration of overlapping functions as well as the forecasting of possible results from their alteration, unification or abolition. As a result, emphasis will be given to the elimination of outdated provisions or to the correction of incoherencies and legal gaps.

- **Limitation of administrative obstacles**

Public Administration has imposed from time to time regulations which oblige enterprises and citizens to execute or avoid certain actions, aiming at their compliance with obligatory regulations (context obligations). At the same time, Public Administration has imposed additional obligations to citizen/enterprises for

information purposes, with regard to the observance of these regulations (briefing obligations).

Certain projects are included in this action category, which will specify and decrease Administrative obstacles (imposed by relevant legislative regulations) and burden enterprises in order to update the Administration. Additionally, this category of actions includes projects to minimise shared powers in selected operations of the Public Administration agents and the assessment of possible effects of the alteration or abolition of a part thereof. Changes will result from the aforementioned projects in issues of control, approval, authorization and so on.

- **Abolition of certificates issue**

For projects that belong to this category of actions, the usefulness of administrative transactions will be examined, aiming at the identification and amendment of supporting documents – certificates which do not respond to modern needs. Moreover, it will seek to abolish the issuing of certificates containing information either deemed unnecessary or because other modern methods of exchange of the certain information exist. This category will also include projects facilitating or automating the distribution of information contained in certificates, with the aim of abolishing conventional issuing of certificates.

- **Codification – simplification of legislation for specific user groups**

Producing legislation is based on what services are empowered to do. As a result various entities legislate for a specific citizen group. The diffusion of legislation across many different regulations impedes communication between Citizens and Administration. In the framework of the present category of actions, projects will be funded for codification-simplification of legislation for specific user groups such as businessmen, economic immigrants, farmers and so on.

- **Re-engineering of administrative procedures**

This specific action category aims at the implementation of ways and means of re-engineering, and the simplification of procedures based on unified criteria.

Moreover, this action category also includes specific actions for the smooth transition to the simplification of procedures, such as briefing of citizens and employees, the results surveillance mechanism, the management of possible effects and so on.

4. CONCLUSIONS

The aim of the Operational Program “POLITEIA” is the provision of quality services to the Citizen, adapted to the needs of individual groups of citizens, applying Citizen Relationship Management. Exploiting technologies allows the cope with more effective cooperation between the Public Administration services, so that, apart from upgrading services provided, the speed can pick up and procedures can be simplified or facilitated.

Simultaneously, the participation of citizens and economic entities is required, so as to exploit the potential of using new electronic services.

Increasing Possibility for Access to publicly provided Services can be achieved by electronic provision of services to the Citizens (as many services can be provided electronically). In this case it should be remembered that not all Citizens can receive services from Public Administration with the use of computers (eg. senior citizens, specific groups etc.). Consequently, the exploitation on the one hand of alternative communication means (i.e. mobile phones, digital television etc.), and on the other, the creation of conditions so that services or transaction points with the public will be able to provide completed services within the logic of one stop services, form the basic instruments for the creation of a pluralist environment for the service of citizens.

With regard to **managing Social Exclusion**, two considerations have been taken into account: The first concerns specific groups of citizens, who due to objective difficulties (PWSN, senior citizens etc.) have been somewhat isolated. The second concerns the management for Overcoming Administrative Obstacles. In general, we can say that the provision of services in the Greek public services, according to the operational programme “Politeia”, includes alternative options, in order to avoid generating discrimination and consequently exclusion of some “sensible” citizen categories.

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THE COMBINATION OF MARKETING AND KNOWLEDGE MANAGEMENT STRATEGIES IN TRAVEL AGENCIES

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ABSTRACT

Database marketing has recently become a matter of central interest to marketing research, because it is one of the main expressions of the modern marketing paradigm of relationship marketing. The present paper explores the use of explicit knowledge from data mining among 115 travel agencies in Thessaloniki (Greece) in developing database-marketing policies. The relationship between customer orientation and the use of customer databases by travel agencies is examined. According to the results, the use of customer databases is relatively widespread; however, it is not explicitly linked with a customer-orientated strategy in most of these travel agencies. Nevertheless, customer-orientated agencies seem to hold more positive views on the contribution of customer databases in acquiring and retaining customers.

Keywords: Knowledge Management; Database Marketing; Data Mining.

1. INTRODUCTION

According to data from the World Tourism Organization (WTO), Greece came 15th in a list of the world's most desired destinations, and the tourism sector constitutes a core element of the Greek economy. According to the World Travel & Tourism Council (WTTC), tourism represented 4.9% of the total gross domestic product (GDP) of Greece in 2002 (US\$6.3 billion). The prediction for 2012 is that tourism will contribute 5.2% of Greek GDP (that is, US\$14.6 billion) [ICAP (2003)].

Travel agencies constitute an integral part of tourism and thus provide essential support to the national economy. According to data from ICAP Hellas, the largest business information and consulting firm in Greece, there are 4000 active travel agencies in Greece. In the region of Thessaloniki, there are an estimated 236 travel agencies, and these represent the third-highest turnover in Greece (€54.30 million) after those in Attica (€717.12 million) and in the region of Dodecanese (€61.67 million).

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Travel agencies have reached a turning point in their development as they are now forced to deal with constantly increasing competition and other pressures from numerous other businesses that have become active in the field of tourism. On-line travel agencies have tended to replace traditional travel agencies in many of the services they offer, and airline and hotel companies have reduced the agents' commissions. Within such a competitive environment, travel agencies have had to develop customer-orientated approaches with a view to establishing long-term relationships with their clients (Oppermann, 1999). In this way, they seek to offer personalized services with a view to engendering customer loyalty. In other words, travel agencies have come to recognize the importance of relationship marketing. An essential tool in this development is the advantageous use of data about their customers - as acquired through knowledge-management systems.

The present paper therefore focuses on database marketing in general and data-mining techniques in particular, as important ways of acquiring knowledge about customers. After a literature review, the use of customer databases, statistical methods, and data-mining techniques are examined in an empirical study. The conclusions and implications for management are then presented. The findings of this study are of interest for practitioners and academics alike.

2. LITERATURE REVIEW AND RESEARCH QUESTIONS

2.1. Knowledge management and marketing

The relationship between knowledge management and marketing has been mainly explored by researchers of internal marketing. Indeed, Ballantyne's (2000) definition made the two almost synonymous when he observed that: "Internal relationship marketing is a relationship development strategy for the purpose of knowledge renewal".

According to the theory of internal marketing, employees of an enterprise should be treated as "internal customers" (Berry, 1981), because their satisfaction and their level of content will reflect the satisfaction of "external customers" (Piercy, 1995). As internal customers, employees should be knowledgeable about issues that enable them to be of service to the external customers of the enterprise (Ballantyne, 1997). In discussing service enterprises such as travel agencies, Grönroos (1981) referred to this knowledge as "customer consciousness". This can be described as 'secret' tacit knowledge (Polanyi, 1966), whereby employees remain focused on customers and the satisfaction of their needs in the most effective manner (Ballantyne, 1998).

This knowledge should be diffused to all employees - not only to those who are in direct communication with customers (Gummesson, 1987). According to Gummesson (1990a, 1990b), marketing is not restricted to professional marketers; it also involves numerous other employees - such as those working in research and development

(R&D), planning, delivery, customer training, invoicing, and credit management. These employees can have a decisive effect on the success of a marketing strategy, and Gummesson (1990a) therefore called them “part-time marketers”. Indeed, Gummesson (1990b) stated that, in service industries (such as travel agencies), these part-time marketers have a more significant influence on marketing success than do full-time marketers.

The importance of part-time marketers is most apparent in the so-called ‘moments of truth’ of service encounters (Gremler et al., 1993), (Paraskevas, 2001) or “point-of-marketing” (Gummesson, 1990a). Moments of truth are those moments when a service employee communicates with a customer (Gummesson, 1990b). At that moment, the employee might not be able to respond appropriately to the customer’s demands because he or she has not examined that customer’s profile and does not appreciate that customer’s needs. Employees can find themselves in this situation if they believe that the acquisition of such knowledge lies solely within the responsibility of the full-time professional marketers of the enterprise. To avoid this significant risk, Ballantyne (2003), has suggested a “knowledge-renewal procedure”, which is grounded in the theory of knowledge creation of Nonaka and Takeuchi (1995). The second phase of this “knowledge-renewal procedure” is called “code breaking”. It is concerned with the transformation of tacit knowledge to explicit knowledge with the help of market research and the storage of data in databases.

The present study focuses on this particular aspect of the procedure - with a view to examining: (1) the nature of consumer databases in general; and (2) how database marketing can be used in travel agencies to transform tacit knowledge about customers to explicit knowledge - and ensure that this knowledge is disseminated to all employees of the enterprise.

2.2. Database marketing

In recent years, marketing has shifted from a transactional perspective to a relational perspective (Lindgreen et al., 2004). The transactional perspective in marketing was concerned with transactions implemented in accordance with the principles of the so-called “marketing mix”, whereas the relational perspective refers to what has become known as “relationship marketing” (Grönroos, 1994). According to Grönroos (1990), the role of relationship marketing is “... to identify and establish, maintain, and enhance relationships with customers and other stakeholders, at a profit, so that the objectives of all parties involved are met ... by a mutual exchange and fulfillment of promises”.

Database marketing is of great assistance in such an undertaking. Along with electronic marketing (e-marketing), interactive marketing, and network marketing, database marketing represents one of the principal expressions of relationship marketing (Coviello et al., 1997 and 2001). Indeed, when database marketing is used

with the intention of strengthening relationships with customers, relationship marketing and database marketing become almost indistinguishable (DeTienne and Thompson, 1996). In these circumstances, a database is the collection, storage, and utilization of a large store of useful knowledge about customers with the aim of benefiting both the enterprise and the customers (Denise et al., 1997).

Database marketing can be an important tool in ensuring the success of travel agencies. This is because competition in the field of tourism is global, and enterprises that wish to succeed must understand the culture and particular features of every single traveler (Pitta, 1998; Bender and Fish, 2000). According to Oppermann (1999), tourist enterprises tend to collect data on their customers more actively than do other business sectors.

Databases enable travel agencies to store a variety of different information. Zahay et al. (2004) demonstrated that it is crucial for enterprises to keep relational data (lifestyle, social data, and psychographic data) in addition to transactional data (purchasing behavior, accounts information). Indeed, relational data are of even greater importance in developing a marketing strategy (Zahay et al., 2004).

To apply database marketing effectively, enterprises should have a long-term, customer oriented strategy that aims at the continuous service of customers over a prolonged time with a view to meeting their needs most effectively (Cook, 1994 and Kumar et al., 1998). Such a strategy must be personalized (Kahan, 1988). Rather than an expensive advertising campaign run from a central marketing department, it requires a broader understanding of personalized customer service diffused throughout the organization into all departments and all employees (Grönroos, 1997). Customer orientation thus begins with understanding the special needs of individual customers, and ends with the diffusion of this vital knowledge to all employees through knowledge-management and internal-marketing policies (Vassiliadis et al., 2004; Fotiadis et al., 2004). Database marketing and data mining enable customer-orientated enterprises to define their best customers, to comprehend their needs and desires, and to focus their marketing strategies to satisfy these needs in the most effective manner.

The above discussion leads to the following research questions for the present study (with respect to databases):

Q1: Do travel agencies in Thessaloniki collect data on their customers through customer databases?

Q2: If so:

- How long do they keep these databases?
- What is the cost of their development and maintenance?
- Do they plan to upgrade them?
- How many records do they have?

Q3: What type of customer data do travel agencies in Thessaloniki collect?

Q4: What is the contribution of consumer databases to the marketing strategies of travel agencies in Thessaloniki?

Q5: Do travel agencies in Thessaloniki that maintain customer databases tend to be more customer-orientated than those that do not do so?

2.3. Data mining

The implicit knowledge that is included in databases is a function of the knowledge-management procedures followed by the enterprise. In his description of the procedure that should be followed by knowledge portals, Firestone (2000) noted that a ‘distributed organizational knowledge base’ (DOKB) should be formed—which affects the structures that are incorporated in the organization’s knowledge. These structures are the normative procedures of the enterprise - the plans, culture, strategy, policies, and monitoring of the enterprise and its information technology. The marketing strategy is one of these normative procedures, and knowledge marketing can be used to enhance such a strategy by using new knowledge to develop and maximize its results. However, to use the implicit knowledge of databases in database marketing, it is necessary to undertake “data mining” to extract useful information from the total data (Han and Kamber, 2001).

The main statistical models used in database marketing are “segmentation” and “predictive modeling” (Verhoef et al., 2002). Predictive modeling involves the prediction of consumers’ responses to promotional and/or advertising messages, whereas segmentation refers to the division of customers into groups that are internally uniform but mutually mixed. Taken together, these models mean that, in reacting to marketing strategies, the members of a given group behave in the same way as one another, but different from the members of other groups.

Various statistical methods are used in data mining. These include ‘cross tabulation’ and assessment of ‘RFM’ (recency, frequency, and monetary value) (Weng and Liu, 2003; Stone, 1988 and Dwyer, 1997), as well as the ‘Chi-squared automatic interaction detector’ (CHAID) and ‘classification and regression trees’ CART (Bult and Wansbeek, 1993). In addition, the increasing demand of enterprises for new and improved statistical methods for optimal targeting of consumers has led to the development of numerous innovative methods—such as genetic algorithms and neural networks.

However, an important question is whether customer databases are simply tactical tools for travel agencies or whether they constitute the core of their marketing strategies. Cooke (1994) has emphasized that numerous agencies consider that the use of information from their databases is a complex procedure. They therefore treat their

databases as storage units for the execution of basic tasks—rather than as a vital part of a comprehensive marketing strategy.

The above discussion leads to three additional research questions for the present study (with respect to data mining):

Q6: Do the travel agencies in Thessaloniki that maintain customer databases process their data using data-mining statistical models (such as segmentation and predictive modelling)?

Q7: Do the travel agencies in Thessaloniki that maintain customer databases process their data using data-mining statistical techniques (such as cross-tabulation and RFM)?

Q8: Do travel agencies in Thessaloniki that maintain customer databases believe that their databases are simply tactical tools or do they regard them as being at the core of their marketing strategies?

3. METHODOLOGY

3.1. Measures

Personal interviews of travel-agency employees were undertaken by students of the University of Macedonia who were specially trained for this purpose. The interviews were based on a structured questionnaire which resulted from a study of the relevant literature. The employees who replied to the questionnaire were either the head of the computer department (if such a department existed in a given agency) or the pertinent employee charged with the processing of databases.

The relevant dimensions developed by Kumar et al., (1998) were used to estimate market orientation. The dimension of customer orientation consisted of six statement items (for example: “Our customers’ satisfaction is our main goal”) whereas the dimension of long-term orientation consisted of five statement items (for example: “We satisfy all key-customers on a long-term basis”).

Questions were adopted from the research of Negus (1996) with respect to the following parameters: (1) estimation of the cost of development and maintenance; (2) updating of customer databases; (3) the records included in the databases; and (4) the contribution of the databases to the enterprises. In addition, questions on the use of data-mining techniques and the types of recorded data were adopted from research conducted by Verhoef et al., (2002). Finally, details of the enterprises and the respondents were requested, together with basic questions in relation to overall orientation towards database marketing, for example: “Do you use your customer database as a tactical tool or as the core of your marketing strategy” (Cooke, 1994)?

3.2. Sample

In all, 236 travel agencies active in the area of Thessaloniki were targeted in the present research. Following a search, the research team located the addresses of 150 agencies. Some agencies failed to reply, and some questionnaires were inadequately completed. A final total of 115 completed questionnaires were collected as the sample for the present research. Consequently, the responses represented 48.7% of all travel agencies in Thessaloniki, and the response rate of the targeted sample was 77% (a satisfactory percentage).

The enterprises sample according to the Runs Test and based on the variable of the number of employees appears to be random (Table 1). In addition, the selection of employees based on the variables sex, age, level of education and years of employment at the same position appears randomly.

TABLE 1: SAMPLE RANDOMNESS

	Number of Employees (a)	Sex (b)	Age (a)	Level of Education (a)	Years of Employment in the Same Position (a)
Asymp. Sig. (2-tailed)	,875	,524	,332	,726	,779

a - median; b - means

As can be seen in Table 2, 46.1% of the travel agencies had customer databases (thus answering the first research question). Table 2 also demonstrates that most agencies were of a small size - with 80.9% employing 1–9 employees. Most (77.4%) were engaged in a combination of business-to-business activities and business-to-customer activities.

TABLE 2: TRAVEL AGENCIES DATA

	Count	Percentage
Number of Respondents	115	100
Existence of Customer Database	115	100
Yes	53	46.1
No	62	53.9
Number of employees	115	100
0-1	10	8.7
2-9	83	72.2
10-49	16	13.9
50-249	4	3.5

250 and more	2	1.7
Type of enterprise	114	99.1
Business to Business	7	6.1
Business to Consumer	18	15.7
Business to Business & Business to Consumer	89	77.4

With respect to the respondents, Table 3 shows that there were approximately equal proportions of males and females. All age groups were represented, with the majority (87%) being between 25 and 54 years of age. All levels of education were also represented—that is, high-school (lyceum) graduates (20%), those who had undertaken studies at institutes of vocational training (IEK) (20.9%), graduates of technological educational institutions (TEI) (20%), and university graduates (18.3%).

TABLE 3: RESPONDENTS' DATA

	Count	Percentage
Number of Respondents	115	100
Gender	115	100
Female	60	52.2
Male	55	47.8
Age	115	100
18-24	7	6.1
25-34	46	40.0
35-44	27	23.5
54-54	27	23.5
55-64	5	4.3
Over 65	3	2.6
Level of Education	112	97.4
Primary school	0	0
High School	1	.9
Lyceum	23	20.0
Technical school	5	4.3
É.Ã.É.	24	20.9
Ô.Ã.É.	23	20.0
University	21	18.3
Post-graduate studies	14	12.2
Doctoral studies	1	.9
Years of employment in the same position	115	100
Under 6 months	3	2.6
6 months -1.5 years	6	5.2
1.5 years- 3 years	12	10.4

3 years – 10 years	36	31.3
Over 10 years	58	50.4

As far as the years of employment in the same position were concerned, the sample contained 31.3% with 3–10 years of experience in the same role and 50.4% with more than 10 years of experience in the same role.

4. RESULTS

The results showed that 34.6% of the 52 travel agencies had maintained a consumer database for more than four years (Table 4). Development and maintenance cost less than €20.000 for 60% of the sample. A majority of the sample (61.5%) planned to upgrade their consumer databases. A large volume of data (up to 50,000 records; 80%) was yet to be registered.

Of the types of data kept by travel agencies, Table 4 also shows that the following percentages were noted for ‘relational data’: demographics 50% (of travel agencies), social details 40.4%, and lifestyle 25%. For transactional data, the percentages were: purchase behavior 42.3% and information concerning accounts 48.07%.

TABLE 4: ELEMENTS OF DATABASE

	Count	Percent	Valid Percent
Number of Respondents	115	100	
How long do you keep the customer Database?	52	45.2	100
Less than 6 months	2	1.7	3.8
6 months – 1 year	10	8.7	19.2
1 year – 2 years	7	6.1	13.5
2 year – 3 years	10	8.7	19.2
3 year – 4 years	5	4.3	9.6
Over 4 years	18	15.7	34.6
Development and maintenance cost of the customer database to date.	50	43.5	100
Under € 20.000	30	26.1	60.0
€ 20.000 - € 50.000	9	7.8	18.0
€ 50.000 - € 150.000	5	4.3	10.0
€150.000 - € 500.000	3	2.6	6.0
€ 500.000 - € 1.000.000	1	.9	2.0
Over 1.000.000	2	1.7	4.0
Do you plan to upgrade your customer database within the coming year?	52	45.2	100

Yes	32	27.8	61.5
No	20	17.4	38.5
Approximately, how many records are there in your customer database?	49	42.6	100
Less than 10.000	28	24.3	57.6
10.000 – 50.000	11	9.6	22.4
50.000 – 150.000	4	3.5	8.2
150.000 – 500.000	4	3.5	8.2
Over 500.000	2	1.7	4.1
Customers' details registered in your customer Database	52	45.2	100
Name & Surname	52	45.2	100
Demographics	26	22.6	50
Social details	21	18.3	40.4
Purchase Behavior	22	19.1	42.3
Lifestyle	13	11.3	25
Information concerning their accounts	25	21.7	48.07

With respect to respondents' opinions on the contribution of consumer databases to the success of various marketing targets, Table 5 shows a positive response. Of the respondents, 86.8% felt that the consumer database contributed to the acquisition of new customers, 84.9% believed that it assisted in engendering loyalty to the agency, 81.2% felt that it assisted in retaining existing customers, and 74.4% believed that it increased the sales and profits of the agency.

TABLE 5: RESPONDENTS' VIEWPOINT IN RELATION TO THE CONTRIBUTION OF THE CUSTOMER DATABASE

	I totally disagree / I disagree %	I agree / I totally agree %
1. In keeping your existing customers	1,9%	81,2%
2. In increasing your sales	0%	77,4%
3. In increasing the profits of your agency	1,9%	77,4%
4. In acquiring new customers	0%	86,8%
5. In making your customers loyal towards your agency	0%	84,9%

TABLE 6: ELEMENTS OF DATABASE

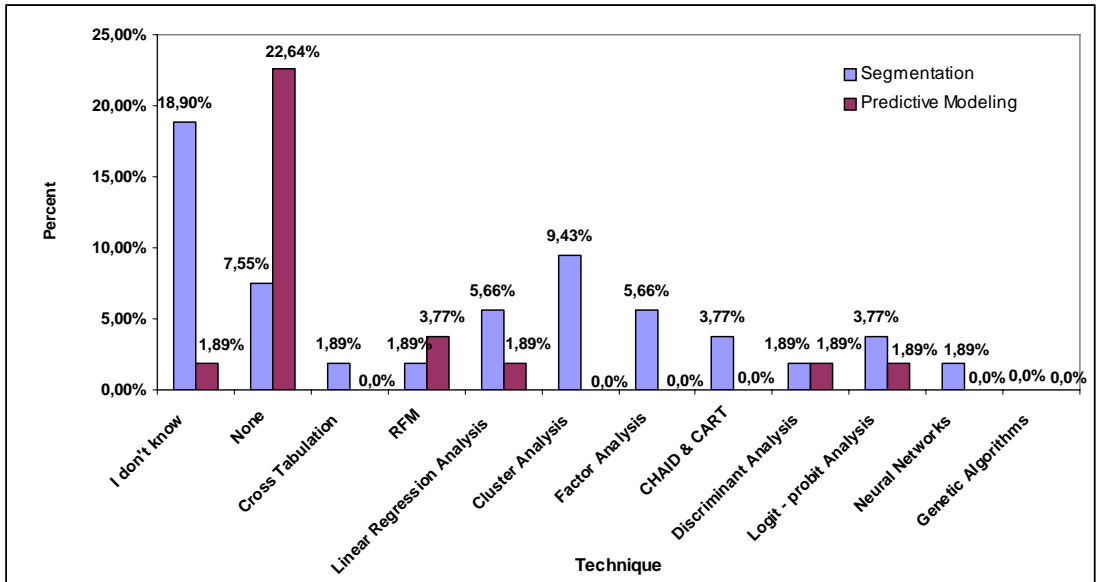
	Count	Percent	Valid Percent
Number of Respondents	115	100	
Data Mining techniques used in mining information that can be used in Marketing	53	46.1	100
I don't know	15	13.0	28.3
None	6	5.2	11.3
Segmentation	24	20.9	45.3
Predictive Modeling	8	7	15.1
Statistical techniques used in Data Mining	53	46.1	100
I don't know	23	20	37.73
None	12	10.4	22.64
Cross Tabulation	1	.9	1.9
RFM (Recency, Frequency, Monetary)	3	2.6	5.6
Linear Regression Analysis	4	3.5	7.55
Cluster Analysis	5	4.3	9.43
Factor Analysis	3	2.6	5.6
CHAID or CART	2	1.7	3.77
Discriminant Analysis	2	1.7	3.77
Logit- probit Analysis	3	2.6	5.66
Neural Networks	2	1.7	3.77
Genetic Algorithms	0	0	0
In what way is the Customer Database used within the agency	52	45.2	100
As a tool	35	30.4	67.3
As the core of the agency marketing strategy	17	14.8	32.7

With respect to the elements of the database (Table 6), it seems that a significant proportion (28.3%) was unaware whether a data-mining model had been employed, and only 32 out of 53 agencies had actually used such a model (45.3% segmentation and 15.1% predictive modeling). Travel agencies seem to perceive customer databases more as tactical tools (67.3%), rather than as central to their marketing strategies.

The proportion of 'don't knows' increased in the case of statistical techniques (37.73% of those who had consumer databases). Cluster analysis was the most commonly used technique (9.43%), followed by linear retrogression (7.55%). Virtually all of the other techniques received minimal positive responses. This indicates that data-mining statistical techniques are practically unknown to the pertinent employees in the computer departments of travel agencies. The small number of positive responses jeopardizes the research conclusions.

It was apparent that the agencies using the CHAID and CART techniques applied them exclusively to segmentation (Figure 1). This is in accordance with the recommendations of Bult and Wansbeek (1995), who have stated that the CHAID and CART techniques are not appropriate for predictive modeling.

FIGURE 1: SEGMENTATION VS PREDICTIVE MODELING



The low percentages for discriminant analysis and genetic algorithms are not surprising. Discriminant analysis is not a particularly effective method (Verhoef et al., 2002) and genetic algorithms are a very recent statistical technique. The low percentages recorded here for cross tabulation and RFM techniques are not in accordance with findings from other studies in other countries (Verhoef et al., 2002).

Factor analysis was conducted on responses to questions about customer orientation and long-term orientation. The factor analysis of the present study differed from that of Kumar et al., (1998) because the five dimensions developed by these researchers for market orientation were not used in the present questionnaire. Rather, only two were selected, and these were used to refer to customer orientation. In addition, it should be noted that the two definitions (customer orientation and long-term orientation) were almost identical, although long-term focus is mentioned for a longer period of time. This might have confused the respondents. However, the final categorization of questions in two dimensions (as finally adopted in the present research) was acceptable in view of the fact that they appeared to represent the

meanings of customer orientation and long-term orientation. The respondents appeared to comprehend the meaning of commitment towards the customers and the importance of providing them with value as a long-term expression of customer orientation. On the contrary, “the business effort to discover a new value for the customer” and the “enterprise will to correct each imperfection” were taken into account simply as evidence of customer orientation.

The two new variables were checked for their internal coherence using Cronbach’s alpha. The dimension of customer orientation (Cronbach's alpha 0.762), in particular, was internally coherent. Long-term orientation (Cronbach's alpha 0.609) was also internally coherent, although less so.

The research results show that having a consumer database did not correlate with customer-orientation variables (chi square $p < 0.484$) or with long-term orientation variables (chi square $p < 0.484$).

But the results did present an interesting correlation. Factor analysis demonstrated that views on the contribution of consumer databases (Table 5) were, in essence, constitutive of one factor.

This factor was correlated with the customer-orientation variables and those of the long-term orientation. It was apparent that there was a positive correlation between them - which is important from a statistical point of view (Figure 2).

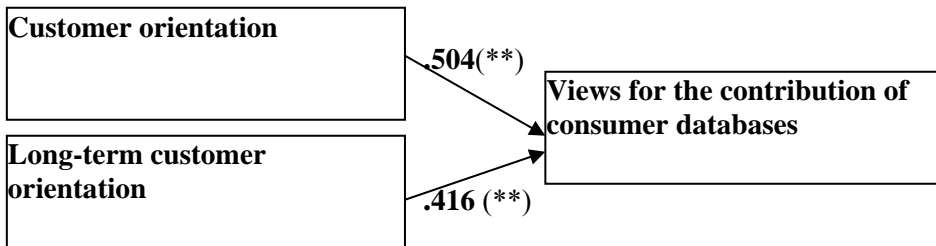
TABLE 7: FACTOR ANALYSIS FOR CUSTOMER ORIENTATION

	Component	
	1	2
A.1		.576
A.2		.524
A.3	.554	
A.4	.696	
A.5	.725	
A.6	.508	.502
A.7		.753
A.8		.774
A.9	.655	
A.10	.800	

TABLE 8: FACTOR ANALYSIS FOR VIEWS ON THE CONTRIBUTION OF CUSTOMER DATABASES

Component	
C.1	.819
C.2	.913
C.3	.789
C.4	.878
C.5	.832
Cronbach's Alpha .895	

FIGURE 2: CORRELATION



Spearman Correlation ** Correlation is significant at the 0.01 level (2-tailed).

5. CONCLUSIONS, MANAGERIAL IMPLICATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

Various conclusions can be drawn from the present research. First, it is evident that a significant proportion (46.1%) of active travel agencies in Thessaloniki, do collect data on their customers in customer databases. However, the collection of this data is not necessarily due to a pre-existing customer-orientated culture. On the contrary, any evidence of a customer-orientated culture is related to positive views about how a customer database might prove useful in customer-targeted policies. This finding demonstrates that agencies with customer databases are not necessarily customer-orientated.

In addition, it is apparent that travel agencies in Thessaloniki retain various forms of relational data (social and lifestyle data) in their databases, as well as data relating to transactions (purchase behavior, information about their accounts). This is worthy of note because it appears that the collection of these sorts of data boosts the effectiveness and development of customer-orientated policies (Zahay et al., 2004).

A significant proportion of travel agencies (32.7%) declared that they use their customer database as their core marketing strategy.

These observations show a positive inclination among travel agencies towards the use of database marketing. However, research results demonstrate little use of the data-mining models and statistical techniques that are necessary for effective database marketing. In summary, Greek travel agencies seem to recognize the importance of database marketing and customer databases (especially the ones that are customer-orientated), but appear to be weak in applying data-mining techniques in practice. This conclusion is in accordance with that reached by Oppermann (1999) - who found that travel agencies do, indeed, have customer databases, but that they do not take advantage of their collected data by transforming them to useful knowledge that could be used to the benefit of the agency.

The conclusions of the present study have significant implications for database professionals in travel agencies (and for information-technology experts in general). It is apparent that people charged with the computerization of travel agencies wish to utilize their customer databases, but that do not have the necessary knowledge to do so. The information technology (IT) enterprises of Thessaloniki that are active in offering consultation in database issues could improve their consultative services and expand their market for particular high-technology products. If people charged with the computerization of travel agencies could become comfortable with the tools and techniques of data mining, they are more likely to ask for consultative IT services in the future - to the mutual benefit of both the consultancy sector and the travel-agency sector.

The results of the study also have managerial implications for the transformation of tacit knowledge to explicit knowledge with the purpose of improving marketing strategies. In enterprises in which the customer databases are adopted mainly for the purpose of arranging every-day paperwork and less for the practice of an overall marketing strategy, the transformation of tacit knowledge to explicit knowledge is urgently required, in association with the development of a customer-orientated service culture.

The most important limitation of the present study lies with the relatively small sample that was used. Even though almost half of the travel agencies of Thessaloniki were studied, this is only a small proportion of all Greek travel agencies. This limitation does not allow generalizability of the present findings, but it does enable suggestions to be made regarding more extensive research in this area.

The following research questions are worthy of exploration:

- Under which circumstances does the customer orientation of an agency influence its use of customer databases, data mining, and the transformation of tacit knowledge to explicit knowledge (with the intention of developing marketing strategies)?
- Do travel agencies in Thessaloniki (and Greece in general) follow the standard of corresponding agencies in other countries - for example, New

Zealand (Oppermann, 1999) - in collecting data on their customers to a greater extent than do other business sectors?

- What is the level of consultancy services in database issues, and how can they be upgraded to assist in the use of data-mining techniques in market development?
- Could the way in which databases are used (either as a tactical tool or as the basis of a marketing strategy) be a variable that influences the relationship between a customer-orientated policy and the use of data-mining techniques for the transformation of data into knowledge? This could be investigated by a multi-variable questionnaire exploring the way in which databases are used - with numerous questions and multiple variables to provide a reliable and verifiable study.

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AGENT BEHAVIOUR, FINANCIAL MARKET AND WELFARE THEORY

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ABSTRACT

Important literature has pointed out the coordination problems faced by the agents, in particular the financial ones when they have to manage risk and their portfolio. If we follow Kaldor and his definition of speculation, we can then point out that in this case, agents are short-term oriented because they have to face an uncertain reality: uncertainty about the behaviour of their competitors in the present and in the future, and uncertainty about future reality which will be built by their own decision and action. Then each agent tries to anticipate the behaviour of the others, on one hand to do the same (then on average it is a way to avoid loss), on the other hand to try to find an opportunity which has not been seen by the other (the way to earn money, doing what the other can't or may not do), that means mimetic versus opportunism (or free rider behaviour). In both cases, we have a kind of reproduction of habits without any collective perspective. The latent hypothesis is that individual decision produces people satisfaction, social welfare. We think there are three reasons to disagree with this hypothesis (excluding the fact that it does not work in reality): a lack of specific tools that allow us to anticipate change and communicate it; a lack of understanding "what is common reality"; a lack of an agreement on "what we can do together and how". That means that we need to understand that rules are not a constraint like they could be in the contract theory, but rather a thorough outline to help us coordinate a collective action.

Keywords: Coordination Problems; Financial Agents; Rules; Collective Action; Social Welfare.

1. INTRODUCTION

In previous papers Pruden, Baets and Paraque (2004) and Baets, Paraque and Pruden (2004) have shown another interpretation of the irrationality of financial market agents. We organized the analysis around a "positivist theory" of behavioural finance and the "nominal theory" of technical market analysis rules. The behavioural finance model for structuring the data of the experiment was the Cusp Catastrophe

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Model of non-linear behaviour. The nominal model, based upon the data exposed by the positivist model, was a group of four technical market analysis principles and one mental discipline/trading strategy discipline. We have also tried to extend the interpretations of the findings.

The previous paper presented a methodology to anticipate the break down of financial markets. The question could therefore be, not only how to anticipate the consequences of financial agents' behaviour, but also how to give these agents a way to modify their own behaviour. That means, above all, to have a common vision of our world. Our present contribution tries to give an answer.

2. THE CAL TECH EXPERIMENT

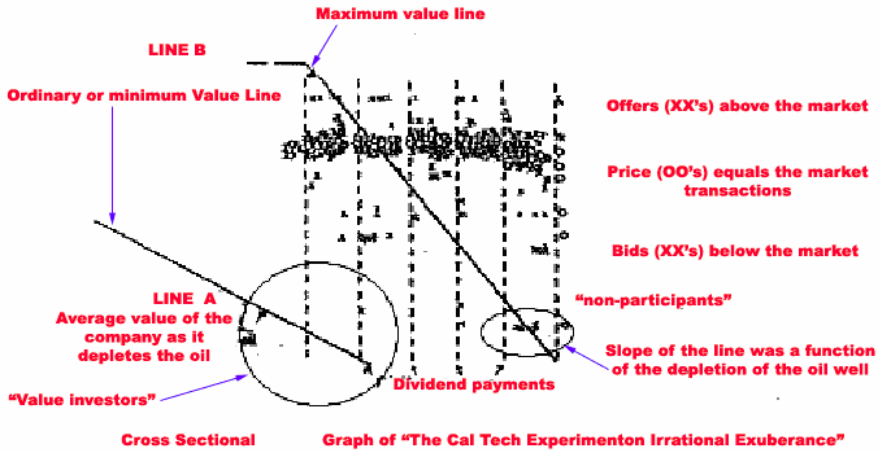
The focus of attention of the Cal Tech experiment was upon the "Irrational Exuberance" displayed by student traders who swarmed together to carry the price of shares in a fictitious oil well to an extreme level that far exceeded the oil well's underlying economic value. The belief system of these student traders who engaged in the buying and selling of shares so as to collect dividend and then by winning the game was essentially "the greater fool theory". Indeed so long as there was someone else willing to buy at an even higher price, each individual agent or trader involved would seemingly be acting rationally even. Although their collective behaviour created a speculative bubble that led to a subsequent crash in the price of the stock. This experiment at Cal Tech took place in the year 1997; this experiment revealed the boom and bust that soon followed in the world's stock market.

Could the result have been any different? Were there available alternative belief systems that could have brought about a different constellation of results? If so at what price and under what circumstances?

In this paper the authors wish to look beyond the obvious, dramatic data of the experiment in an effort to examine the presence of the possibility of alternative belief systems and different structures of interaction and exchange. The co-authors consider this as a challenge and an uncertain undertaking. The author's appreciate that the structure and the motivation of human actors that behave as individual agents in a competitive exchange environment may inevitably induce the conditions of rampant speculation according to the greater fool theory. But the negative consequences to the majority of the participants in such a savage game bring up issues of social ethics and social welfare.

However another simple dream about utopian ideal, the possibilities of substantially different outcomes will be considered to the extent possible related to the data generated by the experiment involving human actors; to the premises or rules of the game that may have pre-destined the behaviour of boom and bust.

FIGURE 1: THE OVERALL RESULT OF THE EXPERIMENT



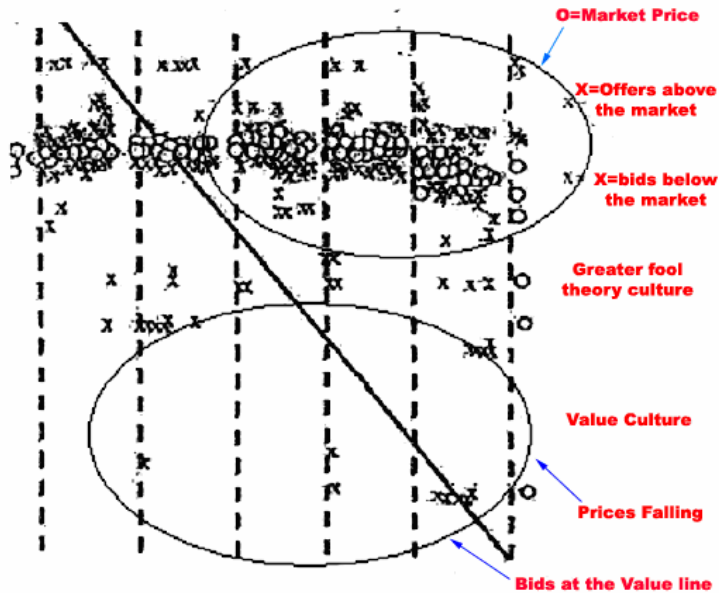
2.1. The Value investor

One can observe that a cadre of student participants declined to play the game according to the premises of the greater fool theory. Presumably the belief, the value system of these non-participants was akin to a well known Wall Street type, the “value investor” had us posit an assumption that the value system, the belief system, held by the non-participants was that of the rational economic man, the rational investors. The pattern of bids offered at prices consistently at or below the diagonal vectors showed a strong conviction in their beliefs to value pricing as opposed to the price levels generated by the actors who were playing the greater fool game.

Elsewhere in this paper Professor Baets will offer possible explanatory models to account for the phenomenon of the non-participants, being motivated by repulsion or revulsion of the speculative crowd. They absented or indeed steadfastly adhered to the economics of the value investors. It should be noted that in the real financial market of the late 1990’s, the value investor was left sitting on the sidelines because they refused to risk money in the inflated values of the late 1990’s, even at the cost of under performing the market averages and losing customers. Like a religious cult that sensed that the end-of-the-world was nearing, they may have become ever more steadfast in their belief as the collective madness of the crowd vaulted the spare price of the oil well in the experiment even farther from underlying economic value. Ultimately other agents in the game gathered around their banner as can be observed in the rising chorus of lower and lower priced bids (see figure 1, the rise in fear greed bids). This migration toward the value pole and ever lower bids reflects the contrasts

and implicit conflict between the two cultures of value investing versus the greater fool theory.

FIGURE 2: TRADING RANGE



2.2. A question of social welfare

The “rules of the game” set out by Professor Plott and his colleagues to guide the participants of the game are the following one. Given the “dog-eat-dog and the winner(s) take the cash-prize environment” set forth for students in the game (and in our security markets), it was no surprise that a speculative bubble would emerge not that the resultant structure of collective behaviour could be explained with agent behaviour and swarm theory.

These “rules of the road” were set outside the experiment but never the less they were potentially determining, perhaps those rules set in motion a “self fulfilling prophecy”. Implicit in those rules were a set of rules, a belief system about how a market should be structured and how the player ought to be encouraged to behave.

In the third section an alternative “set of rules of the game” is offered based upon the belief system of “social welfare”. Some conjectures will be present as to how the collective behaviour of the experiment may have played out. A different assemblage of price data, bids and offers could be seen to have resulted. The consequences to all

but especially the victims of the crash can be seen. Finally the last section of the paper will conclude with some preliminary hypotheses and operational definitions which could be employed in a future experiment to test the social welfare model.

3. AGENT BEHAVIOUR AND SWARM-LIKE THEORY

In this paper, we have observed a clustered, rather linear and persistent behaviour of actors/agents. In fact, an interesting observation is that the model visualizes the emergence of certain kinds of local stabilities (probably comparable to what is known as attractors in the complexity theory), before something like a (belief ?) shift takes place moving the agents and the system into what could be called discontinuous behaviour. The model indeed visualizes the emergence of interacting agents, but as it is defined, of course, it does not allow us to gain insight into the mechanism of the construction of the phenomenon it describes. If we would like to take this argument further than what the paper suggests, and get a deeper understanding of both the market behaviour and, specifically, the role of the interacting agents, we should go deeper into theories that are emergent in nature, and simulate agent based behaviour.

3.1. SWARM-like theories

Behavioural Finance and Technical Analysis point out the co-ordination problem of the agent's action. This is commonly accepted, but, until now, it has been studied under a certain (widely accepted) ontological and epistemological assumption, i.e. that reality is based on a causal interaction between variables, independent of e.g. the emotional aspects of human agents. It is based on the assumption of a majority of cognitive psychologists who still consider the mind as a processor (a computer) of information that is outside the person. It denies that the observer creates his own reality while observing, and it denies the fact that market behaviour is made up of a momentaneous interaction of agents (and their respective behaviours). A consequence of this ontology is that only what can be measured could be managed, and more broadly, only what can be observed exists. This is the rational, reductionist view of human behaviour that we often find in technical analysis. Within this ontological and epistemological choice, causality makes sense, and (knowledge) engineering approaches should be able to give answers to issues of market behaviour. Knowledge engineering techniques have been extensively used in order to construct market analysis tools.

Keep in mind that we classically talk about emotions and psychology, but always and only within the above described ontology. This seriously limits our view and hence what we will eventually observe. In order to observe differently, we have to first investigate the ontology behind our thinking. An ontology that increasingly gains attention is the one based on what neurobiologists (Maturana and Varela, 1980 and

1992) call an enacted and embodied view of cognition. This ontology is one that is based on the acceptance that the observer himself creates the reality which he observes.

3.2. There is no reality, but it is created as you observe

This concept would indeed allow us to explain what we could call non-rational behaviour of traders for instance. Traders are not irrational, but they can only observe the reality which their experience (and their learning) allows them to observe. This ontology empowers the agents to interact in a network, and then to create together (in a dynamic process) a reality. In fact this ontology is an emergent one, in which knowledge and behaviour are continuously created via interaction, and hence cannot be anticipated using top-down (causal) models.

Indeed, this ontology is not based on a causal relationship, but rather on synchronicity (being-together-in-time). We will get back to that later. For the time being, and in order to understand the essence of the agents' behaviour, we make the choice that reality is created via the interaction of individual agents who create emergent behaviour. In the words of the famous Spanish poet Machado: there is no path; you lay down the path in walking.

What do we understand by enacted and embodied cognition, within an autopoietic system? An autopoietic system is a neurobiological concept that describes the behaviour of any neurobiological colony, including, therefore, human behaviour. An autopoietic system is one that organises and reproduces itself in such a way that is ideal for survival. The human body is an excellent example of an autopoietic system. Cells in the body continuously reproduce in order to help the body to survive. Furthermore, the body is completely self-organised.

Within such a system we can identify a mind (say an individual's mind) that is embodied, which means that it is not just embrained (the computer metaphor) but literally distributed through the body and via the sensors (the human senses) in continuous contact with its environment. The environment co-creates the mind. Cognition, which will eventually lead to behaviour, is then enacted. Enaction has two dimensions: action and shaping. Therefore cognitive action always contains these two components: action and creation. All the rest is information. We hit a common misunderstanding between knowledge and information. Information is static (and linear) and therefore can be copied and repeated, whereas knowledge is dynamic (and non-linear) and therefore needs to be created over and over again each time. The complexity theory (Nicolis and Prigogine, 1989) has proven that to us over the last 30 years. The enacted view on knowledge (and behaviour) allows us to explore models that have creative force and show emergent behaviour.

An often-made assumption, that we presume is too limited, is that rational (human) behaviour could only be causal (based on the hidden ontological assumption

described above). If it is causal one can write it down in equations that in turn would drive reality. If we really believe in behavioural theories, then let us take this to its finality: agent theory.

For the sake of clarity, we have already touched upon a few concepts of complexity theory (dynamic non-linear systems behaviour) that shed a completely different light on market behaviour (Baets, 1998a and 1998b). Systems are auto-organisational, based on an embodied mind and on enacted cognition. Systems and knowledge are created over and over again (which is, by the way, what our brain does, since it is the most efficient way of organisation).

Reality is not Newtonian (fixed time-space concept) but emergent (co-created in interaction). In Baets's habilitation thesis I have called that "The quantum structure of business" (Baets, 2004). The complexity theory goes much further, but for the purpose of our argument, we can leave it here.

An interesting development, based on this complexity theory is what we know as artificial life research (Langton, 1980) and one of its further developments, i.e. agent based simulations (Holland, 1998). Agent based simulations is a development in artificial intelligence, that is in contrast to what AI is unfortunately still known for, i.e. expert systems, that exposes learning behaviour. Indeed agent simulations are based on the interaction of individual agents, that have individual qualities and purposes, and that agree on a minimum set of interaction rules.

Behaviour is clearly dynamic and produced in the continuous interaction of agents that exchange information with each other. The least one can say is that this is very similar to human behaviour, particularly on financial markets. Whereas Catastrophe theory implies a time dimension, agent based simulation gives due importance to what Prigogine (1989) calls the "constructive role of time". Each time we bring in the arrow of time, let us say the constructive role of interaction, behaviour gets created; it literally emerges.

This view supposes a number of "interacting" agents within a specific field (of action) each having their own personal qualities and goals and following a minimum set of interaction and exchange rules. The question then becomes how such a complex system could come to a coherent state. Most suggestions go in the same direction. Maturana and Varela (1980, 1992) suggest resonance as the mechanism; Sheldrake suggests morphogenetic fields: sense is made out of interaction in a non causal way. This mechanism of resonance is what occurs in "SWARM"- like societies (Epstein and Axtell, 1996). In fact we are talking here of agent theories. In agent theory, as already suggested, we only have to identify the playing field (let us say a particular financial market) and a number of agents. Each agent is autonomous in achieving his goal(s) and is, of course, gifted with qualities (like experience, information, human characteristics). Those agents interact with each other based on a minimum number of interaction rules. Those rules govern the behaviour in the simulation, but they also define the learning of the different agents. Then agents, translating learning into

(new) action, co-create in interaction with each other, continuously new (and adapted behaviour). Indeed, in such a market, the “path is laid down in walking”, just as reality is in financial markets.

The argument hence becomes to take Catastrophe theory one step further to its intrinsic ultimate claim, i.e. that time plays a constructive role in (market) behaviour Baets (2004 and 2005), points out that a number of projects are undertaken using agent theories, but not yet in the financial markets. They have been successfully used in order to visualise the emergence of innovation in a large consumer goods company; to visualize emergent market behaviour, allowing identification of an adapted market introduction strategy; to study emergent states in conflict handling.

The basic question leads us back to the ontological choices we discussed earlier. Once we accept complexity theory as a promising paradigm, we cannot avoid the question of causality. Quantum mechanics has given the world a tremendous dilemma. How is it possible that two photons moving in different directions still keep in instantaneous contact? As Pauli, Van Meijgaard (2002), amongst others, suggests, there should indeed be interaction in a non-local field. Things seem to occur “at the same time” without having any causal relationship. It is this quantum structure of (financial markets) that deserves our attention in order to improve our understanding of market behaviour (Baets, 2004).

4. THE NEED OF AN AGREEMENT TO ACT TOGETHER

“Behavioural Finance and Technical Analysis” point out the coordination problem of the agent’s actions. More precisely, the question is the effect of the action of certain kinds of agents on collective welfare and, by consequence, how to anticipate negative consequences. There are three main answers: the first is the laws and other professional rules such as SEC, Basle and so on; the second is the availability of tools allowing actors to avoid problems like the one proposed in the article quoted above; the last is at the level of the individual and it’s own capacity to take into account the collective interest of so-called social welfare. The neoclassical theory says that, under specific hypotheses, markets, and particularly financial markets, are the best way to ensure the right allocation of resources. But, since the hypotheses are never verified, we need other tools to manage the market. We need to have tools to help us. We will not speak about laws and regulations as prepared by Basle 2.

We will focus on the behaviour of the individual. There is a lot of criticism pointing out the myopia of the agents, the mimicking of their decisions. Even these attitudes are the cause of the breakdown, when one loses his confidence in the others or, more relevant, one decides to change because he is able to influence the market (in fact it is the only way to win: a winner needs a lot of losers; that means a lot of followers). But because of that, it could be possible to anticipate the breakdown if we

are able to identify the main proxy of these strategies as it was demonstrated in the paper.

4.1. The main point is the social responsibility of each of us.

This responsibility cannot be assumed without clear rules of action. I would like to take an example.

In an article published in October 2001, Jensen (2001) highlights the operational limitations of the prevailing interpretation/use made of value maximization and the stakeholder theory.

He then engages in a criticism of the central model of entrepreneurship with the polar figure of the manager and the shareholder in which he wants to introduce other stakeholders of the firm.

Without it being explicitly stated, it seems that the different financial scandals may have a bearing on the desire to explain the operating conditions proposed by these two theories, which are, in some ways, competing, and in others, complementary.

On the one hand, it is argued that value maximization for the shareholder, with all the problems in terms of monitoring this entails, is the best way to attain social welfare in a market economy; on the other hand, stakeholder theory stresses the need to take into account the interests of all of the stakeholders in a firm, including the customers, all of the suppliers, and the employees. According to Jensen, the complementarities of the two theories stem from the need to understand value maximization from a collective point of view: social welfare is only achieved when, on the one hand, “all of the value” contributed by each of the stakeholders is maximized, and on the other, this maximization of value occurs over the long term. The firm is therefore recognized as a historical and complex organization.

However, an operational problem arises if managers are expected to maximize value thus defined, in that there is no reason why the objectives of the various stakeholders should coincide. This criticism is valid both from the point of view of value maximization (how can several objectives be managed simultaneously?) and that of stakeholder theory (how is a common objective to be defined)?

In fact, if Jensen recognizes the relevance of the stakeholder theory, he underlines a problem. This theory is not able to answer the question of how to manage several aims which could diverge. He says, before managing the firm and maximizing its value taking into account the wishes of the stakeholders, there is the need to obtain an agreement, on the one hand about the hierarchies of the aims, on the other hand about the modalities of their accomplishment and the monitoring of the performances of the firms¹. Thus, the agreement is the core of the deal and of the future performance because it determines the manager’s value maximization strategy, in particular in the field of the organization of the firm. For the supporters of the stakeholder theory there is a tool, the “balanced scorecard”, but, in accordance with Jensen, they say nothing

about the initial necessity to obtain agreement on the objectives from every participant involved in the firm and then, on the way to build the common game rules.

4.2. The need for an agreement to act together

This concern, that of “social welfare”, implies dealing with “des problèmes d’informations, d’anticipation et d’évaluation” (Salais et al., 1986, pp. 193). In fact, at a collective level but also at an individual level, we need to agree on a common “reality”, not only to build it but also to agree to act together in this perspective: “L’enjeu de ces négociations est le modèle d’interprétation à retenir pour “construire la réalité” qui se présente à eux [les agents] comme problème à résoudre”² (ibid, pp. 197-198). In other words, this necessary negotiation expresses a convention through which “l’accord des agents sur leur description du monde et leur [permettant] ainsi de coordonner leurs projets”³ (ibid, pp. 236) is approved. That kind of agreement “repose sur des processus sociaux d’élaboration de modèles de représentation de la réalité”⁴ (ibid, pp. 239).

The next question is how to manage this agreement at a collective level and an individual level. For that, we need to identify specific co-ordination principles on which we can obtain an agreement from the stakeholder and the availability of specific tools given the opportunity to manage collective behaviour by anticipating the risk of breakdown - that is, the behaviour of the one who does not play with the same aim. But, it is not possible to negotiate this kind of agreement without discussing the relevance of the criteria of management and the sense of performance, and then the different understandings between the stakeholders. For example, from the workers’ point of view, the starting point must be the value added and not the EBITDA or the cash flow, because the value added is the condition of their wages, despite the fact that wages have an influence on profit⁵.

In total, «entreprendre avec efficacité suppose de maîtriser l’incertitude relative aux marchés, aux technologies et aux produits futurs, la cohérence de ses propres projets par rapport à ceux des autres agents, partenaires ou concurrents»⁶. Nevertheless, the main point is the co-ordination of the agents’ behaviour which deals with the uncertainty of management.

“Dans un contexte de relations aux autres dont on ne peut faire abstraction, l’incertitude tenant à la personne doit être comprise comme une incertitude communicationnelle. Cependant, cette désignation est elle-même ambiguë, car elle pourrait laisser penser que l’incertitude se résume à un problème de circulation de l’information, à une imperfection. Or une information ne peut circuler que si elle a été au préalable élaborée dans un langage commun et que si, par conséquent, elle peut s’ajuster de part et d’autre dans un dispositif qui lui soit congruent (par exemple, la présence de codes identiques)”⁷ (Salais and Storper, 1993).

5. CONCLUSION, DISCUSSION AND IMPLICATIONS

There has been a lot of important literature pointing out the co-ordination problems faced by agents, in particular financial ones, when they have to manage risk and their portfolio. If we follow the thinking of Kaldor (1939) and his definition of speculation, we can then say that agents take a short-term view of things because they have to face an uncertain reality (Aglietta, 2001). Uncertainty about the behaviour of their competitors (the “Other”) in the present and in the future, and uncertainty about future reality arising from their own decisions and actions. Then each agent tries to anticipate the behaviour of the others, on the one hand to do the same thing (anticipating that it is a way to avoid losses), on the other hand to try to find an opportunity which was overlooked by the other (a way to earn money, doing something the other cannot or may not do), in other words mimetic versus opportunism (or free-rider behaviour). In both cases, we have a kind of reproduction of habits without any collective perspective. The latent hypothesis is that individual decision produces people satisfaction, social welfare. We think there are three reasons for disagreeing with this hypothesis (besides the fact that it does not work in reality): a lack of understanding “what is common reality”; a lack of an agreement on “what can we do together and how”; a lack of specific tools allowing us to anticipate change and communicate it. That means that we need to understand that rules are not a constraint like they could be in contract theory (Hart, 1995), but more a thorough outline to help us to co-ordinate a collective action (Moureau and Rivaud-Danset, 2004).

We do not agree with the standard approach based on “methodological individualism” and we are more involved in a global approach focusing on the interaction between people rather than co-ordination between individuals.

To this extent we can define this approach as a “Euro-Mediterranean” approach. This approach highlights the complexity, the diversity, the dynamic and the synchronicity of behaviour (Baets, 2004), in particular behavioural finance, as opposed to rationality, which is in general a way to reduce diversity, static and causality. The interaction between people is not based on causality – a contract cannot be efficient - but on a synchronicity of relationships based on “if you do that and I do that, we can do that together” without any kind of determinism. We call this approach an interpersonal approach (Salais and Storper, 1997). That is an approach where action and behaviour are evaluated in the process of the action itself and in which failure is sanctioned by a certain kind of expulsion from the community of producers, even the social community. So, contracts are not only between individuals but mainly implicitly between communities as we can see with the new ethical mutual funds or social rating. In this way, the deal concerns not only an operation but a process of social welfare.

NOTES

1. Those interested may read a comment, in French, in Paranque (2004).
2. The stake of these negotiations is the model of interpretation of the problems they faced and which the agents have to resolve.
3. The agreement of the agents about their view of the world allows them to coordinate their project.
4. Is based on a social process through which the model of representation of reality is created.
5. “Wages regulation system (la forme salaire in French) maintains the workforce’s lack of awareness of the work that has been achieved” (Salais et al., page 255) to the extent that the accomplished work is revealed through the produced value once the intermediary consumptions have been paid, namely the added value (Salais et al., page 227) as well as the written work by Paul Boccara on the subject at hand (Paul Boccara, 1985).
6. To do something effectively required the mastery of the uncertainty relative to future market, technology and goods, the coherence of its own projects in comparison with those of others agents, partners or competitors.
7. In a context of relationship with others, which is a common background, uncertainty relative to the person must be understood as a communicational uncertainty. However, this definition is itself ambiguous because it could let you think that uncertainty is only a problem of transfer of information, as an imperfection. But information can only be transferred if it is in a common language and then if consequently there is a good fit between both parties (for example, the existence of the identical codes).

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EMERGING BONDS MARKETS CRISES AND CONTAGION: EXTREME DEPENDENCE

DIEGO NICOLÁS LÓPEZ*

ABSTRACT

Recent financial crises suggest the importance of the diffusion mechanism, at an international level of emerging bonds markets shocks. Using extreme value analysis for the sovereign debt spreads of emerging markets, the present paper, explores the extreme dependence of the Colombian risk premium to international financial markets. The architecture of capital markets can lead to a collapse of emerging markets, arguing that fundamentals do not determine the position liquidation totally. The relation between the Colombian country risk and the United States asset markets shows that an increase in global uncertainty defines a "Flight to quality" and therefore an additional increase in the contagion probability for the emerging markets bonds.

Keywords: Contagion; Copula; Financial Crisis; Emerging Markets; Extreme Value Theory.

1. INTRODUCTION

Recent financial crises have diffused faster between emerging markets in general, and have even affected countries with sound fundamentals. Moreover, the link with the country originally affected was not significant. The more recent crises have been characterized by contagion such as, Mexico in 1994, South East Asia in 1997, Russia in 1998, Brazil in 1999, as Turkey and Argentina in 2001. In each one of these cases, a shock over one country trigger a series of extreme events in other countries, having among its many symptoms the increase in the sovereign debt spread. The main target of this work is to accomplish an analysis of the extreme dependence of an emerging sovereign bonds spreads sample having for reference the Colombian country risk. The objective is to analyse the different interactions between emerging markets, conditionally to high volatility spreads periods. Thus, we analyse the direct effect over

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The ideas expressed in this document are personal and do not represent those of the institution I belong. Finally, the remaining errors are my own total responsibility.

the Colombian country risk under an extreme dependence structure. Using a copula function overcomes the econometric difficulty in measuring and defining contagion.

We want to explore if a contagion phenomena towards the risk premium of the Colombian external debt during high volatility periods exists and the principal characteristics that has this transmission.

At the same time, we go far beyond the current literature by carrying on an analysis based on multivariate extreme values for the bonds of emerging countries, work that has not been accomplished having for principal target the relation with the Colombian debt spread. In the first part of the paper, a literature review about international shocks propagation is made. In the second part, we study the empirical literature, which has been the principal tool of analysis. This is the theoretical support of the empirical model build next. In the third part, we analyse the stylised facts for daily frequency financial series. In the fourth part, we develop a univariate analysis that estimates the marginal probability distributions. In the fifth part, we estimate the joint distribution of the stochastic process. In the sixth part, we present the corresponding results.

2. THEORETICAL BACKGROUND

The contagion literature can be divided in two groups. The first one analyses the contagion phenomena under the “balance of payments crisis” point of view. The second one focuses on the dependence between financial markets, arguing for the international diversification of portfolios, and the capital market architecture. Because of incomplete markets or information asymmetries, emerging markets shows multiple equilibriums.

2.1. Non-crises contingent

Forbes and Rigobon (2000a) introduce a difference between the non-crisis contingent and the crisis contingent literature. The first one refers to the shocks that trigger an international propagation, with no change in the transmission channel after the initial shock.

The propagation is justified by economic links between related countries. In this literature the principal channels of contagion are international commerce, as aggregate random shocks.

Spillovers of international commerce refer to significant devaluations, those that can affect the exportations of other countries. This is formally derived in Gerlach and Smets (1995) and empirically by Eichengreen, Rose, and Wyplosz (1997). Aggregate random shocks, equivalent to an external shock, affect in a simultaneously way the fundamentals of a group of countries. Masson (2000) defines those as big changes in

industrialized countries who trigger a crisis in emerging markets. In this case, a hike in international interest rates is considered as an exogenous liquidity shock.

2.2. Crises contingent

The focus of this document refers to the propagation of international shocks, under the point of view in which the transmission mechanism has changed after the initial shock. The transmission is not justified by economical fundamentals or real links between markets, so countries with sound fundamentals could be affected. The principal explanation has been given by multiple equilibriums, endogenous liquidity shocks, and herd behaviour. Multiple equilibriums are realized when a crisis in one market becomes a sunspot in other market as in Masson (2000). The change towards a bad equilibrium is accomplished by investors' expectations without a necessarily significant change in fundamentals.

An endogenous liquidity model is presented by Valdes (1996), as in Calvo (1999a). In this case, information asymmetries play an important role. Informed agents confront a liquidity shock, while the uninformed cannot distinguish between a shock and a bad signal. The rational agent, but uninformed, over react to the signal emitted by the informed investor.

The herd behaviour is presented in Calvo (1996). If there is an inadequate research of fundamentals, it is optimal to sell simultaneously in two markets when a problem appears in one of them.

In this paper, we will focus on the crisis contingent models. Contagion between two countries is defined as the surpass of a threshold for the sovereign debt of country, X_1 , a fact that increases the probability of exceeding the threshold for the debt spread of another country, X_2 , independent of fundamentals.

$$P(X_2 > x_2 | X_1 > x_1) > P(X_2 > x_2 | X_1 \leq x_1) \quad (1)$$

When a *crash*, defined as the excess of a threshold, occurs somewhere in the world, the probability of a simultaneous crash in another country increases.

In this case, the contagion measure depends on the conditional marginal probability under periods of speculative pressure as in Straetmans (2001).

3. EMPIRICAL LITERATURE

Most of the empirical literature lies on the long-term relationship between markets and assets. In general, this literature is concerned with long periods of analysis for the dependence between markets without emphasis on the crisis period in particular. Recently, some studies have concentrated on the relationship between financial

markets in the short run. Longin and Solnik (1995), show that the interaction between financial markets is higher in periods of high volatility.

Likewise, Koedijk, Schafgans and de Vries (1990), remark that while average risks have decreased, “extreme risks” have surged, defining those extreme risks, as large changes in the underlying asset returns.

3.1. Correlation as a measure of dependence

The background of the empirical treatment of this theme is based on a frequency data that is at least monthly. The approaches in this way have been dominated by linear regressions as by comparisons between correlations. An example of this literature is Kofman and Martens (1997). Another focus has been based on vector autoregressive as in Von Furstenberg and Jeon (1989).

More specifically, dichotomous models support recent approximations. In this case the relationship between the evolution of fundamentals and the probability of a crisis occurrence is established as in Kaminsky and Reinhart (1998).

This type of analysis in general has emphasised on the relationship between variables in the long run. However, contagion is eminently a short run phenomenon between financial markets, a characteristic that implies daily frequency data.

On the other hand, linear correlation is a measure of dependence for multivariate normal distributions. The properties of dependence in the world of elliptical distributions are unsustainable in the non-elliptical world. The Pearson correlation is not a measure of dependence of a random variable vector as in Embrechts, McNeil, Strautman (1999). Correlation is a measure of dependence only in the particular case of normal multivariate distribution.

Then, it is a stylised fact that financial series are non-normal, non stationary, non lineal and heteroscedastics.

Following Embrecht et al. (1999) the correlation is defined when variances are finite; in this case, daily data of financial series exhibit fat tails, so correlation is not an adequate tool for studying the dependence over the tails of the distribution. Correlation quantifies a dependence measure over the central moments of the distribution, not only for the tails of the distribution where extreme events are concentrated. An appropriate measure must extract the entire dependence structure.

Furthermore, Pearson correlation is not robust to heteroscedasticity as shown in Forbes and Rigobon (1999), and in Boyer, Gibson, Loretan (1999).

Daily financial series follow an autoregressive conditional volatility process, where volatility clusters in periods of crises following the phenomena known as “*Volatility Clustering*”¹, the reason why correlation is not an adequate tool for carrying a dependence analysis between financial markets. The properties that a dependence measure must accomplish have been analysed by Nelsen (1998). A dependence measure δ must:

- δ must be defined for every pair (X_1, X_2)
- $\delta(X_1, X_2) = \delta(X_2, X_1)$; The measure of dependence must be symmetric.
- $0 \leq \delta(X_1, X_2) \leq 1$;
- $\delta(X_1, X_2) = 0$; If and only if X_1 y X_2 are independents.
- $\delta(X_1, X_2) = 1$; If and only if X_1 y X_2 are comonotonic or counter monotonic.
- $\delta(X_1, X_2) = \delta(T_1(X_1), T_2(X_2))$; The measure of dependence must be invariant to monotonic transformations in the marginals.

Pearson correlation does not describe the dependence measure criteria appropriately given the fact that correlation depends on the joint density function, and at the same time on the marginal distributions. In contrast, a copula accomplishes this criteria and represents the true statistical dependence because it links the marginal distributions of a group of individual risks to the joint distribution. Hence, Longin and Solnik (2000) have proposed the extreme value approximation in a multivariate scenario, having for objective the analysis of the dependence between financial assets.

4. STYLISTED FACTS

4.1. Non normality, non-stationarity, non-linearity, heteroscedasticity

The database is a daily spread² sample, in basic points, of the Emerging Market Bond Index Global³.

Observations start on the 02/01/98 until 10/06/05. The sample represents a speculative period. The end of the sample is established as the day in which the new issues of Argentina's sovereign debt were added to the EMBIG index. Since this date, new bonds are added to the index replacing the defaulted bonds of this country. The capital market opened again its doors to this type of issues, representing a decrease in the uncertainty and hence defining the end of a period characterized by high levels of risk aversion.

The sovereign debt spreads used are: Argentina, Brazil, Bulgaria, Colombia, China, Ecuador, Philippines, Malaysia, Morocco, Mexico, Nigeria, Panama, Peru, Poland, Russia, South Africa, Thailand, Turkey, and Venezuela. In addition, we incorporated the EMBIG Asia index, representative of the Asian emerging markets in general. Also for a complete analysis we carried on a comparison with the principal United States assets; we incorporated in this sample the Moody's Seasoned Aaa Corporate Bond Yield index, the Moody's Seasoned Baa Corporate Bond Yield, the Spx Vix index from the Cboe, the S&P 500 index, the Nasdaq index, the Morgan Stanley Equity Latin America MSCI index, as the High Yields index of Merrill Lynch⁴.

The first building block of the econometric model is the identification of the principal statistical characteristics of the series.

By this way, daily financial series are leptokurtic, so they present fat tails. Then they are not normal. Also, they present a unitary root, and consequently, they are not stationary⁵.

Series are not independent and identically distributed over time, there exist evidence of non linearity dependence exist, which is a signal of chaos in the series and finally they present periods of volatility cluster, so they are heretoscedastics⁶.

Univariate normality could be verified by the Jarque Bera test. For every one of the series of the sample the null hypothesis of normality is rejected at the 1% level of confidence. Most of the level series have a skewness different to zero and a kurtosis more than three.

Series are not lineal either. The BDS test rejects the null hypothesis of linearity for every one of the series in levels.

This result is evidence of serial autocorrelation, non-stationary, heteroscedasticity or chaos.

The Dickey Fuller test tells us that the series presents a unitary root, while the autocorrelogram shows a high persistence path. The Q statistics of Ljung Box are highly significant; hence series are non stationary⁷.

At the same time, we analyse the autocorrelogram of second order as the Arch test, which identifies an autoregressive conditional heteroscedastic process for most of the series⁸.

4.2. Modelling the marginal dynamics

It is necessary to model the particular dynamics of the mean and the conditional volatility, in order to obtain a white noise tail distribution, given the stylised facts presented in the first part of the text. Thus, we use the filter developed in Mc Neil and Frey (2000).

4.2.1. Debt spreads filter: ARMA-GARCH

Filtering the series is a two-stage process, resulting on the conditional tail distribution for the heteroscedastics returns series of the sovereign debt.

1. We estimate an AR (1)-GARCH (1;1) model. The mean follows an AR (1) process with a GARCH (1;1) error.

$$\begin{aligned} X_t &= \varphi_t + \sigma_t \varepsilon_t \\ \varphi_t &= \lambda X_{t-1} \end{aligned} \quad (2)$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 (X_{t-1} - \varphi_{t-1})^2 + \beta_1 \sigma_{t-1}^2$$

$$\alpha_0 > 0; \alpha_1, \beta_1 \geq 0; \alpha_1 + \beta_1 \leq 1; |\lambda| < 1; E(\varepsilon_t) = 0; E(\varepsilon_t^2) = 1; \varepsilon_t \sim iid;$$

This process could be written as:

$$\begin{aligned}
 X_t &= \sum_{k=0}^{\infty} \lambda^k y_{t-k} \\
 y_t &= \sigma_t \varepsilon_t \\
 \sigma_t^2 &= \alpha_0 + \alpha_1 y_{t-1}^2 + \beta_1 \sigma_{t-1}^2
 \end{aligned} \tag{3}$$

Where $(y_t)_{t \in \mathbb{Z}}$ is a GARCH (1;1).

From this model, we obtain the standardized residuals:

$$(\hat{z}_{t-n+1}, \dots, \hat{z}_t) = \left(\frac{X_{t-n+1} - \hat{\phi}_{t-n+1}}{\hat{\sigma}_{t-n+1}}, \dots, \frac{X_t - \hat{\phi}_t}{\hat{\sigma}_t} \right) \tag{4}$$

Running the BDS test for the residuals, there are not enough statistical evidence to reject the null hypothesis that residuals are distributed independent and identically for most of the series⁹.

Also, not enough statistical evidence exists, for each one of the series, to reject the null hypothesis that residuals do not follow an ARCH process in their principal lags. The filter output or residuals are homoscedastic series and independent and identically distributed.

2. From the standardized residuals, that is, a white noise process for most of the series, we use the extreme value theory (EVT) searching for an accurate estimation of the univariates probabilities.

The second moments are not enough to explain the diffusion phenomena. Following the contagion definition established in this document, we are interested in large catastrophic movements in the spreads. The extreme value theory and in particular the “Peaks over threshold”¹⁰ methodology is focused on those events that exceed a high threshold, so we model these events in a different manner in contrast to the rest of the distribution.

5. METHODOLOGY: UNIVARIATE ANALYSIS, MARGINAL DISTRIBUTIONS

For the estimation of a conditional probability of simultaneous crash, we must estimate three probabilities in two stages. In the first stage, we calculate the two univariate probabilities of the excess returns, in particular $P(X_1 > x_1)$ and $P(X_2 > x_2)$.

In the second stage, we estimate the bivariate probability of excesses, that means, $P(X_1 > x_1 \cap X_2 > x_2)$. By this approach we have non endogeneity, omitted variables or heteroscedasticity problems in the estimation.

5.1. Extreme value theory

The methodological solution is based on the “outliers” of the series. We could appreciate that the extreme events occur at the same time for most of the countries.

The determination of the threshold by three different ways, assure the robustness of the model in the univariate stage. The proximity of the different thresholds confirms a lack of sensibility to the number of observations used by each method. The different methods used are the mean excess graph, the hill estimator plot, and the minimization of the mean square error of the hill estimator through a bootstrapping approach¹¹.

5.2. Mean excess discontinuity

Under this methodology, we take the observations of the residual series losses that exceed a defined threshold, u , then we model in a separate form the observations chosen in comparison to the total distribution. The estimation is by maximum likelihood over the Generalized Pareto Distribution (GPD). This is a two parameters distribution with functional form:

$$G_{\xi, \beta} = \begin{cases} 1 - (1 + \xi x / \beta)^{-1/\xi} & \xi \neq 0 \\ 1 - \exp(-x / \beta) & \xi = 0 \end{cases} \quad (5)$$

Where $\beta > 0$, $y \geq 0$ when $\xi \geq 0$ $y \leq -\beta/\xi$ when $\xi < 0$.

The distribution is called generalized in the sense that it comports other distributions implicitly, as the ordinary Pareto distribution when $\xi > 0$, the exponential distribution when $\xi = 0$ and the Pareto II distribution when $\xi < 0$. ξ is the shape parameter and β is the scale parameter. If $\xi > 0$, the shape parameter reflects fat tails. The excess distribution over a threshold, u , is defined as:

$$Fu(y) = P\{X - u \leq y | X > u\} \quad (6)$$

For $0 \leq y \leq x_0 - u$, where $x_0 \leq \infty$ is the final point in the right side of Fu .

The excess distribution represents the probability that a loss exceeds the threshold u by a quantity y , given the information that we have exceeded the threshold.

Using the following limit theorem, developed in Balkema and de Haan (1974) as in Pickands (1975), the convergence of the maximum distribution towards a Generalized Pareto Distribution can be demonstrated, assuming that the random variable sequences are iid, as our residuals estimated, we have then:

$$\lim_{u \rightarrow x_0} \sup_{0 \leq y \leq x_0 - u} |F_u(y) - G_{\xi, \beta(u)}(y)| = 0 \quad (7)$$

$$F_u(y) = G_{\xi, \beta(u)}(y) \quad (8)$$

Assuming that N_u from n data exceeds the threshold, the GPD is fitted to N_u excesses using the maximum likelihood estimation.

One way of defining the threshold is graphically. If the excess over the threshold $(X-u)$ follows a Generalized Pareto Distribution with parameters $\xi < 1$ and β , the excess over the threshold u is:

$$e(u) = E[X - u | X > u] = \frac{\beta + \xi u}{1 - \xi}; \quad (9)$$

This mean excess function is linear in the threshold u , graphically this special feature will be useful for the identification of an appropriate value for the threshold.

The excess distribution function could be written as:

$$1 - F(x) = (1 - F(u))(1 - F_u(x - u)) \quad (10)$$

And, the tail estimator could be expressed as:

$$F(\hat{x}) = 1 - \frac{N_u}{n} \left(1 + \frac{\hat{\xi}}{\hat{\beta}} \frac{x - u}{\hat{\beta}} \right)^{-1/\hat{\xi}} \quad (11)$$

The number of observations in the tail of the distribution is defined as: $N = k$. This gives a threshold for the statistic $(k+1)$.

The residuals ordered are $u_1 \geq u_2 \geq \dots \geq u_n$; The Generalized Pareto distribution whose parameters are ξ and β fit the residuals excess over a determined threshold, it is $(u_{(1)} - u_{(k+1)}, \dots, u_{(k)} - u_{(k+1)})$. From the functional form of the tail estimator we can take quantils over the unconditionals tails, with an associated probability p .

$$VaR_q = u_q = u_{(k+1)} + \frac{\hat{\beta}_k}{\hat{\xi}_k} \left(\left(\frac{1-q}{k/n} \right)^{-\hat{\xi}_k} - 1 \right) \quad (12)$$

The parameters β, ξ , are estimated by maximum likelihood.

Finally, the “Expected Shortfall”¹³ is obtained by the combination of the excess mean of the distribution and the VaR equation:

$$ES_q = \frac{VaR_q}{1 - \hat{\xi}} + \frac{\hat{\beta} - \hat{\xi} u}{(1 - \hat{\xi})} \quad (13)$$

The selection of a threshold is restricted to a “trade off” between choosing a high threshold, making the asymptotic theorem be irrelevant and choosing a lower threshold, in order to have enough observations for the estimation of the tail. The

graphical technique for the determination of the threshold is based on the fact that the distribution of beyond threshold losses is linear in the threshold.

Then, we proceed to estimate the GPD. For most of the series we obtain a positive value for the parameter ξ , results that suggest fat tails.

5.3. Graphic method for the Hill estimator

Another method is based on the determination of the threshold by the hill estimator plot¹⁴. Fat tail distributions have the characteristic that tails distributions decays slowly, while other functions decrease exponentially.

$$\lim_{q \rightarrow \infty} \frac{1 - F(qx)}{1 - F(x)} = x^{-\alpha}, x > 0, \alpha > 0. \quad (14)$$

In this particular case, F is in the maximum domain of attraction of the Frechet distribution, defining the tail behavior.

The tail index α tells us how fat the distribution tail is. Under independent and identically distributed observations we obtain the following maximum likelihood estimator:

$$\gamma = \frac{1}{\alpha} = \frac{1}{m} \sum_{j=0}^{m-1} \ln \left(\frac{X_{[n-j]}}{X_{[n-m]}} \right) \quad (15)$$

This is the Hill estimator, the smaller the Alpha is and the higher is the Hill estimator, then the tail distribution will be fatter.

$X_{[n-m]}$ defines the break point and so the beginning of the tail distribution. We have the same “trade off” between bias and variance. If $X_{[n-m]}$ is too high, we will be too close to the mean of the total distribution and Alpha will be biased. On the opposite side, if $X_{[n-m]}$ is too low, we will be far in the tails, then the estimator will be very volatile, when we sum one observation or we take one away. The k -associated values for the optimal threshold are defined graphically where the Hill estimator is the most stable possible.

5.4. Mean square error bootstrapping

Another method to determine the optimal threshold is the minimization of the mean square error of the Hill estimator that gives a numerical solution to the “trade off” between bias and variance. Using the asymptotical properties of the Hill estimator, we minimize the mean square error by a bootstrap simulation as in Hall (1990):

$$ECM(n_1, k_1) = E(\alpha_{n_1}^*(k_1) - \alpha_n(k) | \chi)^2 \quad (16)$$

Accordingly, we have three different methods to define the tail threshold and so the univariate probabilities.

Comparing the determination of each one of the thresholds by each method, we could see that the worst thing that could happen to an investor with a long position over every one of this debt issues is very close, and the results of the different methods do not differ in an ample measure¹⁵.

The results of this univariate approach reveal the skewness between the tails of the distribution. The left tail is higher than the right tail for most of the cases. The average percentage of observations used in the left tail is 7,386% of the entire sample, while in the right tail we worked with 4,909% of the total observations. The probability that an investor has extreme losses is higher than the probability of presenting the same profit level.

6. MULTIVARIATE ANALYSIS: JOINT DISTRIBUTION

This is the second stage of the empirical model; in this part we estimate the joint probability of extreme events. Specifically, it is necessary to use a function that links the tails of the two distributions for the analysis of the residuals dependence. A first approach consists of the analysis of the concordance between variables.

The concordance is defined as large changes in one variable that are followed by large values in another variable. Likewise, low values in one variable are followed by low values in another variable. The concordance catches the extreme dependence that can surge of the non-linearity. For measuring the concordance we use the Kendall's Tao:

$$\tau = \tau_{x,y} = [P(X_1 - X_2)(Y_1 - Y_2) > 0] - [P(X_1 - X_2)(Y - Y_{21}) < 0] \quad (17)$$

This is the probability of concordance less than the probability of discordance. Another measure is the Spearman Rho:

$$\rho_s = \frac{\sum_{i=1}^n \left(R_i - \bar{R} \right) \left(S_i - \bar{S} \right)}{\sqrt{\sum_{i=1}^n \left(R_i - \bar{R} \right)^2} \sqrt{\sum_{i=1}^n \left(S_i - \bar{S} \right)^2}} \quad (18)$$

These two measures quantify the monotonic degree of dependence between two variables. For the sample, the correlation between the spreads residuals is significant. Nevertheless, the high degree of concordance seen through the Tao and Rho, suggests that a part of the dependence is concentrated on the tails of the distribution. The results for the Kendall Tao and the Spearman Rho are very close to the "Frechet upper bound" evidence that the spreads of the sample are an increasing transformation of the Colombian spread. Hence, the country's risk increases in a simultaneous way. Although, for the representative safe assets series, Aaa and Baa assets in the United

States, the Tao and the Rho are very close to the “Frechet lower bound” evidence of a negative dependence on extreme events. When one of these two series over reacts, the Colombian spread moves in the opposite direction.

6.1. Joint distribution identification

A copula can be defined as a dependence function between random variables. It is a function that links the marginal with the multivariate distribution. The copula represents the entire dependence structure.

$$F(z_1, z_2; \theta) = C(F_1(z_1), F_2(z_2); \theta) \quad (19)$$

C is the copula function; it is unique as it was demonstrated by the Sklar theorem¹⁶. A huge number of copula families exist, but for the extreme value modeling few are adequate. The families that matter in this case are copulas associated with a generalized extreme value distribution.

Let a bivariate vector of random variables (X_1, X_2) with distribution functions F_1 and F_2 as a copula function C, the probability of a contagion phenomena is:

$$P(X_2 > x_2 | X_1 > x_1) > P(X_2 > x_2 | X_1 \leq x_1) \quad (20)$$

$$P(X_2 > F_2^{-1}(\alpha_2) | X_1 > F_1^{-1}(\alpha_1)) \geq P(X_2 > F_2^{-1}(\alpha_2) | X_1 \leq F_1^{-1}(\alpha_1)) \quad (21)$$

$$\lambda = \lim_{u \rightarrow 1^-} P\{X_2 \geq F_2^{-1}(u) | X_1 > F_1^{-1}(u)\}^{17} \quad (22)$$

Lambda¹⁸ is the dependence index, defining the conditional probability that a *crash* occurs in a market, given the fact that a *crash* has occurred in another similar market.

Our approach uses as tool the estimation of the joint distribution for the determination of the probability of a conditional *crash*, and by using a copula we extract all the dependence information. Specifically, it is necessary to adopt the best functional form for the copula function. The copula family will be defined by the goodness of fit between the empirical and the diverse theoretical copulas, as by the main characteristics of each family.

6.2. Calculating the empirical copula

This estimator calculates the frequency of exceeding two different thresholds for a couple of variables.

$$C_n\left(\frac{i}{n}, \frac{j}{n}\right) = \frac{1}{n} \sum_{k=1}^n I\{X_{1k} \leq x_{1(i)}; X_{2k} \leq x_{2(j)}\} \quad (23)$$

The empirical copula is the starting point for exploring a finite sample of copulas, $\bar{C} \subset C$, and to find the function that better fit the data. The empirical copula shows us the divergence with the assumption of normality; consequently the contour graphs for the empirical copula are very distant from the contour graphs of the bivariate normal distribution. This suggests that the copula compatibility must deal with positive and the negative dependence in the tail distribution.

6.3. Goodness of fit between the empirical and different theoretical copulas families

We make a goodness of fit quantifying the area between the empirical and the theoretical copulas searching for the best modeling of the stochastic process.

The better fits are attained by copulas derived from the “Archimedean” family, in the case of the BB1, the BB4 and the Gumbel functional forms.

6.4. Maximum likelihood estimation of different Copulas families

Following Longin and Solnik (2001) we emphasize on the “Archimedean” copulas family. Then we calibrate the principal theoretical copulas families based on the historical data of our sample. For the bivariate normal, the Kimeldorf Sampson Copula, Joe, Gumbel, Galambos, and the Husler Reiss copula, the delta parameter increases when the dependency increases. These copulas differ in their functional forms and in the shape of the probability density, which models the probabilistic behavior of random variables. In our case we calibrate the different families searching for a better robustness of the model to the selection of a specific copula. Therefore, the results interpretation is based on the copulas of the “Archimedean” family because it has the best fit to the empirical copula, and also it has key properties that are important in this kind of analysis. In fact, these copulas include the total dependence and independence case asymptotically. Also, it is a more parsimonious model because of the estimation of only one parameter.

The normal copula is the normal bivariate distribution. Which is denoted:

$$C(u_1, u_2) = \Phi_{\beta}(\Phi^{-1}(u_1), \Phi^{-1}(u_2)) \quad (24)$$

$$C(u_1, u_2) = \int_{-\infty}^{\Phi^{-1}(u_1)} \int_{-\infty}^{\Phi^{-1}(u_2)} \frac{1}{2\pi\sqrt{1-\beta^2}} \exp\left(-\frac{1}{2}\left(\frac{x^2 - 2\beta xy + y^2}{1-\beta^2}\right)\right) dx dy \quad (25)$$

Where Φ is the cumulative density function of a $N(0;1)$ and Φ_{β} the cumulative density function of a bivariate normal distribution with correlation coefficient β .

The functional form of the extreme value copulas is:

$$C(u_1^t, \dots, u_n^t) = C^t(u_1, \dots, u_n) \cdot t > 0. \quad (26)$$

The “Archimedean” copulas family has for functional form:

$$C(u, v) = \varphi^{-1}(\varphi(u) + \varphi(v)) \quad (27)$$

Where φ is a function in C^2 , and $\varphi(1) = 0$, $\varphi'(x) < 0$, $\varphi''(x) > 0$. Con $0 \leq x \leq 1$.

The Gumbel copula is an “Archimedean” Copula. That is:

$$C(u_1^t, u_2^t) = \left[\exp(-[(\ln u_1)^\alpha + (-\ln u_1)^\alpha]^{\frac{1}{\alpha}}) \right]^t = C^t(u_1, u_2) \quad (28)$$

At the same time, the copulas families that have two parameters δ, θ are useful for capturing more than one type of dependence. For example, the positive tail dependence, and the negative tail dependence. If dependence in negative tails exists, then, an increase in the spread of one country, negative movements for an investor, will be followed by increases in the spread of another country.

For the BB1¹⁹ copula, the Colombian debt spread exhibits the higher concordance, as showed by the higher theta of the estimation for Mexico (0.54292), Peru (0.44787), Philippines (0.44636), Brazil (0.44255) and Panama (0.42072).

Those countries have as their main characteristic that they are close in terms of their sovereign debt rate and exhibit for principal threat a high external leverage, as structural weaknesses in their public finance.

The smaller theta value, for the negative tail dependence of the Copula BB1, reflects the degree of discordance. Small values are obtained for the series of the Nasdaq (0.11781), High Yield (0.14055), Morocco (0.14832), S&P500 (0.17624), Nigeria (0.18503) and Malaysia (0.19935).

The fact that delta is close to zero suggests that the negative tail dependence between these variables is small. Nigeria owns a small stock of external debt, in contrast with its big reserves of petroleum and gas followed by plans for its exploitation. Malaysia has as its principal strength the fact that it is an external lender in continuous growth, and also it has a high international liquidity capacity. Therefore, there is no empirical evidence that the principal United States indexes, as Nigeria and Malaysia, are conditioning the increase in the Colombian spread, having those countries a higher international potential liquidity at the moment of paying their external debts.

7. ESTIMATION RESULTS

7.1. Bivariate peaks over threshold

Seeking the robustness of the multivariate model results, we calculate first, bivariate peaks over thresholds model. Then, we adjust a joint excesses model over a couple of thresholds.

We can see that the conditional probabilities are very small. Also, the probability of a joint crash is higher than the one expected individually. The probability that Colombia exceeds 3 standard deviations given the fact that another spread has exceeded it, is conditioned in the lower cases by Baa (0.0244), Aaa (0.0296), Morocco (0.1014), High Yield (0.1170), and Malaysia (0.1239).

In comparison, the higher probabilities of contagion are given by the conditioning of Russia (0.4836), Poland (0.4462), Panama (0.3678), Brazil (0.3580), Mexico (0.3569), Venezuela (0.3395), and Peru (0.3314).

For six standard deviations the less contagious series are Baa (0.05313143), High Yield (0.05575592), Aaa (0.06538039), Morocco (0.07251475), Nigeria (0.1108772) and Malaysia (0.112077). In six standard deviations the most contagious series are Russia (0.810943), Mexico (0.7629098), Poland (0.7454879), Brazil (0.6350241), Panama (0.6178745), and Philippines (0.534747).

7.2. Emerging sovereign debt spreads dependence

For the analysis period we found a high dependence, in the negative tail, with countries near geographically even if this is not a constant rule. Also, the dependence is high for countries that belong to the same pair group or at least close in terms of the sovereign long term debt rating.

7.2.1. Extreme dependence

Most of emerging markets series, present dependence in positive and negative tails. This means that extreme events, even if they are positive or negative, they are linked. Analyzing the output of the lambdas estimation (interpreted as a probability) for the copula BB1 and BB4, in some countries, the tail positive dependence is higher than the dependence in the negative tail. Thus, the sensibility to contagion is highly non lineal in the tails. In fact, the univariate results show that the different debt bonds are different types of assets. Also, factors whose dependence is lower have a higher probability of a rise, compared to the probability of a downfall. For the Nasdaq (0.005145965), High Yield (0.007214396), Morocco (0.01010107), S&P500 (0.02685441), Nigeria (0.03321646), and Malaysia (0.04030414), these series have a joint probability *crash* with Colombia smaller than the one of a joint *boom*. On the

other hand, the higher probabilities of contagion toward Colombia are defined by Mexico (0.3546541), Brazil (0.2758545), Peru (0.2756729), Philippines (0.2646324) and Panama (0.2551528). These series have a joint probability crash with Colombia higher than the joint probability of a *boom*.

The highest probability of contagion comes from Mexico, a country desired by the appetite of international direct investment in the short term.

Also, Mexico, as Colombia, shares the same structural weaknesses in their public finances as the same need to accomplish structural reforms with the objective of making the debt service sustainable.

Even if the most representatives tail negative dependences are countries near geographically, as in terms of real links, this is not the main rule, justifying the information extraction process. In fact, in the capital market, information matters before fundamentals. The crisis is transmitted from very distant countries in geographical terms, as in the case of Philippines. Investor possibilities purchasing spectrum, in emerging debt, are countries that do not differentiate even if they are very distinct and distant. This is the case for the associations between Argentina and Turkey, Brazil and Russia, as in this case, Philippines and Colombia. The two last countries have a high external leverage in common. Philippines has not sufficient fiscal flows, increasing its debt compared to its earnings. Increasing the futures flows uncertainty in regards to the debt service. Colombia has a high stock of external debt in comparison to its pair group in terms of sovereign ratings, as structural disequilibria in his public finances.

We made an average of the lambdas by groups of similar countries, as in Laurent (2001). Looking for the establishment of an interdependence measure in others countries, behind external shocks, whatever the origin of this last.

We calculate the lambda average for the tail negative dependence for the BB4 Copula. Making the average of the tail negative dependence for the series of United States assets (Nasdaq, High Yield, S&P500, Vix), the extreme dependence average is (0.019947924).

This is a small result, indicating the low degree of negative dependence from these assets towards the Colombian spread.

At the same time, analyzing the tail dependence with Asian countries (Malaysia, Philippines), we have a low level for Malaysia, but one elevated for Philippines.

In general, Asian countries except Philippines have a high liquidity capacity in terms of their international reserves, because of the current account excesses sustained for many years.

Now, the Embig Asia dependence to Colombia in the negative tail is (0.2010134). This means that even if the Asian crisis was transmitted to Colombia, this was not through Malaysia, but through Philippines and surely those Asian countries issuers of external sovereign debt that do not appear directly in the sample but that are represented in the Embig Asia.

Making the extreme dependence average for countries that are below the investment grade²⁰ for all the sample period (Mexico, Brazil, Peru, Philippines, Panama, Venezuela, Turkey, Ecuador, Argentina, Nigeria) we obtain an average of (0.20672393).

Finally, we made an average for the group of Colombian geographic neighbors, (Venezuela, Ecuador, Panama, Peru and Brazil); we obtain a lambda of (0.22980738).

This is higher than the aggregation of other Latin-American countries in the sample as Mexico and Argentina. Including these two countries the average is (0.22858191) a result that is higher than the aggregation for countries which possess a speculative rating.

Therefore, the geographical proximity has some influence in the conditioning mechanism. Any kind of shock independent of its origin, can influence the Colombian spread by the spreads of neighbor countries, and increase the country risk without being totally determined by fundamentals.

The dominant effect of a crisis is primarily defined in the geographical region in which the crisis is originated. Hence, in financial stress periods, investors seek to sell those assets that possess a high potential volatility, reducing the value at risk of the portfolio. Also, portfolios specialized in geographic zones, increase their appetite for high quality assets. This last strategy reinforces the fact that fundamentals do not totally determine a position sell, role played by the administration logic of a portfolio. Management that must match assets liquidity with liabilities in duration terms, and must define a minimal expected profitability during a defined investment horizon, so the credit quality of an asset in a specific moment is crucial.

This result reinforces the fact that investors follow a sovereign rating as a market signal and behind a loss of confidence, or an increase in uncertainty, it is this market signal that will define investment decisions and so the portfolios management course.

Investors sell or liquidate a profitable position in one country behind a loss given in another one, whose sovereign risk rating is similar. Therefore, the earnings of the positive sell will compensate the losses of the marked negative position, hedging the portfolio profitability and the trading book, but punishing an asset that has not necessarily become riskier.

7.2.2. United States assets markets dependence

The risk perception of the capital market is relative to a safe asset. A comparison with the principal assets of the United States is very important. In fact, the international investors compare the risk profitability relation in emerging markets with those associated to risk free assets and also new technology markets, as the junk bonds in matured markets. The risk-return comparison between assets for the risk-averse investor deals with all the efficient frontier possibilities.

From a univariate point of view, the emerging markets bonds are riskier than the industrialized issues, but they show the same skewness.

Analyzing the relation with the dependence of the Colombian risk country we found discordance in the principal United States indicators.

It follows then that most of the United States assets index dependence concentrates rather in the positive tail than in the negative tail. This is evidence of a “*Flight to quality*”²¹ during stress episodes. Investors sell the riskier searching the safest asset, a reason why emerging markets bonds can collapse together even if their fundamentals are sound. A higher international uncertainty leads an increase in the probability of contagion for the emerging bonds. Finally, the Colombian country risk is more linked to the negative tail dependence with the Vix than with the “*High Yield*” and with that last one more than with the Nasdaq.

This result is explained by the fact that the Vix is representative of the risk aversion at an international level, when this one increases there is a negative effect over the Colombian spread, phenomenon that is not so direct with other indexes.

8. CONCLUSION

This document deals with an empirical analysis of the international capital markets crisis based on extreme events. The proposed methodology solves the econometric modeling problem of the joint structure dependence between debt spreads applying the copula function.

Initial empirical results, that are complemented by the analysis of the dependence with another class of asset, as the United States capital markets index.

We found contagion evidence for the Colombian emerging bonds from the principal international risk factors for the analysis episode. Colombian debt spreads have a high probability of presenting extreme events during high volatile periods conditionally to countries near in geographical terms, as in international sovereign risk ratings, particularly the pair group, even if this last is composed by countries that are not necessarily close in spatial terms neither in economic real links. This last link argues for the information channel of contagion, which is led by the behavior under uncertainty of agents, rather than the movements in fundamentals, even if fundamentals matter. Following Calvo, the international capital market is composed essentially of two types of investors. Those informed and the uninformed. The first one is a leader and the second one is a follower. The uninformed accomplishes a signal extraction process. The “Russian virus”, which was an unexpected panic episode, was propagated through the market architecture, by the imperfections in the functioning of financial markets. The capital market can help spread and multiply the initial shock and this paper is empirical evidence in that way. Poor research about a country and its fundamentals evolution, assuming that diversification will minimize risk, is not necessarily accomplished. Diversification fails in crisis episodes. Sudden

stops of capitals generate an effect that is triggering an unstable equilibrium that could lead to the contagion effect between countries, affecting countries that do not deserve a punishment.

Behind this empirical evidence, given the fact that capital flows has a speculative character in the short run, an alternative for hedging against the contagion effect consists in the deepening or the lengthen of the duration as the increase in the diversification of the external debt in foreign currency. Thereby, deepen on the large part of the yield curve reduce the exposition to a scenario of low liquidity in which the “roll over” of the short term debt will find liquidity restrictions due to the behavior of investors and the market sentiment. The external debt curve must deepen ideally in the large part of the external curve, while liquidity needs must be supplied in the short section of the internal debt curve.

At the same time, for the market risk, the creation of repurchase mechanism over the issues of sovereign debt, as structured notes using put options since the issue of the bond on the primary market, could reduce the market risk of an investor. For the credit risk, special guarantees supplied by a higher credit quality agent, activating in periods of financial turmoil, could reduce the panic of the market, hedging the investor in stress moments.

Finally, attaining a sovereign risk rating at least equal or higher than investment grade constitutes an attractive market signal behind the lack of information or confusion during crisis periods and thus, minimizing the information asymmetries in the capital markets and accessing to an insurance against sudden and extreme changes led by the allocation of international portfolios due to moments of lack of information. Speculative attacks that could potentially drag to the default of the sovereign debt and could go far beyond translating in a shock affecting the real business cycle of the economy.

Research the existence of changes in the conditional extreme dependence structure, for example through the use of information criteria, is the next step to this work. Given these facts, starting the statistical validation of changes in the dependence structure focused on the interpretation of specific macroeconomic events and the interpretation of the reasons of such extreme changes is a task that is left to a future inquiry.

NOTES

1. See Pagan (1996).
2. Returns and risk premiums control the common movements generated by the American treasuries yield curve in the analysis.
3. The Emerging Markets Bond Index Global (EMBIG) published by J.P. Morgan reply total returns for a debt instrument denominated in dollars and issued by sovereign entities from the emerging markets.

4. The US High Yield bonds, are composed by ratings below the threshold Baa/BBB. The volatility index Vix is a weighted average of the implied volatility for put and call options for the S&P500. This index is “*forward looking*”, and represents expectations about the future volatility. The value increases as a result of an increase in the uncertainty. The value diminishes for periods of low volatility, those who are linked to periods of less financial stress.
5. An increase in the yield, means investor losses in his profits and losses book, the return is,

$$- \left(\frac{P_t - P_{t-1}}{P_{t-1}} \right) \approx - (\ln(P_t) - \ln(P_{t-1}))$$
6. A complete explanation of the stylised facts in financial series, as the techniques that have been built to model these characteristics can be found in Pagan A. (1996), The econometrics of financial markets, *Journal of Empirical Finance*.
7. The Vix is the only stationary series without a difference.
8. There is not enough evidence to reject the null hypothesis that data does not follow an Arch process in his principal lags order for the Ecuador Embig and the Asia Embig.
9. After the filter, the Embig China and the Embig Thailand are the unique series that are not independent and identically distributed (iid). The use of the extreme value theory under non-lineal series creates unstable results, and for this reason be careful with the interpretation of these two series.
10. This approach offers a parametric shape of the distribution tail and extrapolate the probabilities in the tail where by definition those probabilities are hard to estimate. See appendix (a) for a better explanation.
11. Bootstrapping is a historical simulation technique based on random sub-sampling.
12. VAR is the abbreviation of Value at Risk, it suggests the worst that could happen, given a level of confidence, with a position in determined asset.
13. The “*Expected Shortfall*” is a sub-additive risk measure. It means it is the worst that could happen given the fact that we have exceeded a threshold. It is defined as: $ES_t = E(Loss_t | Loss_t > VaR_t)$. See appendix (a) for a better explanation.
14. See Hill (1975).
15. By the Hill graphical method the Value at risk is defined

$$as: VaR_{(hill)} = u \left(\left(\frac{n}{k} (1-q) \right)^{-\alpha(n)} \right)$$
16. See Sklar (1959).
17. Lambda is the coefficient of “*upper tail dependence*”. It is the asymptotic result of the contagion definition used in the paper.
18. See appendix (b) for a better explanation.
19. The BB1, BB2, BB4 Copula are built from the “*Archimedean*” Copula.
20. Those bonds rated below investment grade are considered speculative, indicating that the default probability has exceeded an inflection point, increasing this from the threshold of the BBB- more than proportional to the next notches.
21. “*Flight to quality*” refers to the investment flows from volatile assets to risk free assets, during periods of uncertainty or crisis.

APPENDIX

A. Extreme value theory: Peaks over threshold approach.

Traditional approaches in statistics are normal based and is focused on the entire probability distribution function. On the other hand, the extreme value theory is focused on the tails of the distribution.

Let m random variables be independent and identically distributed, X_1, \dots, X_m . And so, $M_n = \max[X_1, \dots, X_n]$ where M_n represents the maximum of observed values over n data. The underlying distribution function is unknown. $F(x) = P(X_i \leq x)$. The excess loss function distribution over a threshold u is defined as:

$$F_u(y) = P(X - u \leq y | X > u) \quad (29)$$

For $0 \leq y \leq x_0 - u$; with $x_0 = \sup\{x \in R : F(x) < 1\}$; this function represents the probability that a loss exceeds a threshold u , for a major quantity than y , knowing that we have exceeded a threshold u . This equation can be written as:

$$\begin{aligned} F_u(y) &= P(X - u \leq y | X > u) = \frac{P(X \leq y + u \cap X > u)}{P(X > u)} = \frac{P(u \leq X \leq y + u)}{1 - P(X \leq u)} = \frac{P(X \leq y + u) - P(X \leq u)}{1 - F(u)} \\ F_u(y) &= \frac{F(y + u) - F(u)}{1 - F(u)} \end{aligned} \quad (30)$$

Balkema and de Haan (1974) as Pickands (1975) demonstrate that for $F_u(y)$ it is possible to find a function that, when the threshold u increases, the distribution function of excesses converges into a non-degenerative distribution.

$$\lim_{u \rightarrow x_0} \sup_{0 \leq y \leq x_0 - u} |F_u(y) - G_{\xi, \beta(u)}(y)| = 0 \quad (31)$$

As u gets large, we then have, $F_u(y) = G_{\xi, \beta}(y)$.

The distribution $F_u(y)$ converges into a generalized Pareto distribution, that is:

$$G_{\xi, \beta} = \begin{cases} 1 - (1 + \xi x / \beta)^{-1/\xi} & \xi \neq 0 \\ 1 - \exp(-x / \beta) & \xi = 0 \end{cases} \quad (32)$$

The distribution has two parameters: β that is a scale parameter, and ξ that is a shape parameter or tail index. When $\xi > 0$, the GPD has fat tails. Now,

as $F_u(y) = \frac{F(y+u) - F(u)}{1 - F(u)}$ if u is large and $y > 0$, we arrive to:

$F_u(y) = G_{\xi, \beta}(y)$. Defining $x = u + y$, a $F(x)$ estimator is:

$$(1 - F(u)) \times F_u(y) = F(y + u) - F(u) \quad (33)$$

$$F(x) = (1 - F(u)) \times G_{\xi, \beta}(x - u) + F(u); \quad (34)$$

The observations proportion that do not exceed the threshold is $F(u)$, then an estimator of this one is the observations proportion over the threshold:

$\hat{F}(u) = \frac{(n - N_u)}{n}$; Where N_u is the excesses number over a threshold u . This is an

empirical estimator of the tail distribution. Replacing in the last equation and using the functional form of the Generalized Pareto Distribution¹, we obtain:

$$\hat{F}(x) = \left(1 - \frac{N_u}{n} \right) + \frac{N_u}{n} \left(1 - \left(1 + \frac{\hat{\xi}(x - u)}{\hat{\beta}} \right)^{-1/\hat{\xi}} \right) \quad (35)$$

$$\hat{F}(x) = 1 - \frac{N_u}{n} \left(1 + \hat{\xi} \frac{(x - u)}{\hat{\beta}} \right)^{-1/\hat{\xi}} \quad (36)$$

The Generalized Pareto Distribution is based on the determination of a threshold u . This one must be large to obtain the convergence in distribution but must represent at the same time extreme values concentrated in the tail of the distribution and by definition scarce.

The value at risk of an asset is $q > F(u)$, this is equivalent to a quantile of the F distribution, so: $VaR_q = F^{-1}(q)$.

It could be obtained by inverting the tail estimator. By this way, we have, $\hat{F}^{-1}(q)$ and so:

$$VaR_q = u + \frac{\hat{\beta}}{\hat{\xi}} \left(\left(\frac{n}{N_u} (1 - q) \right)^{-\hat{\xi}} - 1 \right) \quad (37)$$

The “*Expected Shortfall*” is the expected size of a return exceeding the VaR.

$$ES(\alpha) = E[X | X > VaR(\alpha)] \quad (38)$$

Value at risk tells us the worst that we can lose if an extreme event is realized, while the expected shortfall tells us the expected loss given an extreme event.

The *expected shortfall* is the conditional value at risk. This one can be written as:

$$ES(\alpha) = VaR(\alpha) + E[X - VaR(\alpha) | X > VaR(\alpha)] \quad (39)$$

The second term is the distribution mean excesses over a threshold, the value at risk represent the threshold:

$$ES(\alpha) = VaR(\alpha) + \frac{\beta + \xi(VaR(\alpha) - u)}{1 - \xi} = \frac{VaR(\alpha)}{1 - \xi} + \frac{\beta - \xi u}{1 - \xi} \quad (40)$$

Thus, the “*peaks over threshold*” approach applies the extreme value theory to an excess distribution over a defined threshold that could be defined as the value at risk.

B. Multivariate extreme value theory: Copulas.

A copula is the distribution function of a vector of random variables in R^n with marginal uniforms (0,1). It is a function such as $C: [0,1]^n \rightarrow [0,1]$.

In the bivariate case, it is a two-dimension distribution function in $[0,1]^2$, with marginal uniform (0,1). It is a C function that links the marginal distributions with the joint distribution, so: $F(x_1, x_2) = C(F_1(x_1), F_2(x_2))$ ⁱⁱ;

A two-dimension copula is a function C with the following properties:

$$1- \text{Dom } C = [0,1] \times [0,1]$$

$$2- C(0, u) = C(u, 0) = 0 \text{ and } C(u, 1) = C(1, u) = u \quad \forall u \in [0,1];$$

3- C is increasing: $C(v_1, v_2) - C(v_1, u_2) - C(u_1, v_2) + C(u_1, u_2) \geq 0$. C is increasing in each component. Ever that:

$$(u_1, u_2) \in [0,1]^2$$

$$(v_1, v_2) \in [0,1]^2, \text{ such as, } 0 \leq u_1 \leq v_1 \leq 1 \text{ y } 0 \leq u_2 \leq v_2 \leq 1$$

The copula function of the random variables (X_1, X_2) is invariant under strictly increasing transformations: $\partial_x F_n(x) > 0$. It is then an exhaustive statistical of dependence. Also, if the marginal distributions are continuous based on Sklar's (1959) theorem the copula is unique. This theorem maps a specific copula to each distribution.

In one hand, we have the marginal, and in the other we have the copula, the one that links the marginal and models the dependence between them.

We extract the unique copula C from a multivariate distribution F with continuous marginal F_1, \dots, F_n where:

$$C(F_1(x_1), F_2(x_2), \dots, F_n(x_n)) = F(x_1, x_2, \dots, x_n)$$

$$C(F_1(x_1), F_2(x_2), \dots, F_n(x_n)) = P(X_1 \leq x_1, X_2 \leq x_2, \dots, X_n \leq x_n) \quad (41)$$

$$C(F_1(x_1), F_2(x_2), \dots, F_n(x_n)) = P(F_1^{-1}(U_1) \leq x_1, F_2^{-1}(U_2) \leq x_2, \dots, F_n^{-1}(U_n) \leq x_n)$$

$$C(F_1(x_1), F_2(x_2), \dots, F_n(x_n)) = P(U_1 \leq F_1(x_1), U_2 \leq F_2(x_2), \dots, U_n \leq F_n(x_n))$$

The “Frechet upper bound”, as the “Frechet lower bound”, represents the bounds within the dependence measure and is defined. The first case will be denominated as C^+ and the second as C^- . These are numerically defined as:

$$C^-(u_1, u_2) = \max(u_1 + u_2 - 1, 0)$$

$$C^+(u_1, u_2) = \min(u_1, u_2) \quad (42)$$

For any kind of copula the following order must be respected:

$$C^- \prec C \prec C^+$$

Then, two random variables X_1 and X_2 are countermonotonics, $C = C^-$, if a random variable X as $X_1 = f_1(x)$ and $X_2 = f_2(x)$ with f_1 non-increasing and f_2 non-decreasing exists. Two random variables X_1 and X_2 are comonotonic, $C = C^+$, if a random variable X as $X_1 = f_1(x)$ and $X_2 = f_2(x)$ with f_1 non-increasing and f_2 non-decreasing exists.

The tail dependence is the dependence in the first quadrant of the positive or negative bivariate distribution. If a bivariate copula is defined as:

$$\lim_{u \rightarrow 1} \frac{\bar{C}(u, u)}{1 - u} = \lambda_u \quad (43)$$

And if the limit exists, C has a positive tail dependence if $\lambda \in (0, 1]$. It does not present a positive tail dependence if $\lambda = 0$. Where λ is the parameter of tail dependence. Likewise, if:

$$\lim_{u \rightarrow 0} \frac{\bar{C}(u, u)}{u} = \lambda_L \quad (44)$$

And if the limit exists, C has a negative tail dependence if $\lambda \in (0, 1]$. It does not present a tail dependence if $\lambda = 0$. Then,

$$\lambda_U = \lim_{u \rightarrow 1} P(U_1 > u | U_2 > u) = \lim_{u \rightarrow 0} P(U_2 > u | U_1 > u) \quad (45)$$

If a negative tail dependence exists, large negative movements in the price of an asset will be followed by large negative movements in the price of another asset. “ λ ”,

is the probability that a variable is extreme given that the other is extreme, in value at risk terms; we could write this measure as:

$$\lambda(\text{VaR}) = p(X_2 > F_2^{-1}(\text{VaR}) | X_1 > F_1^{-1}(\text{VaR})) = p(U_2 > \text{VaR} | U_1 > \text{VaR}) = \frac{\bar{C}(u, u)}{1-u} \quad (46)$$

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