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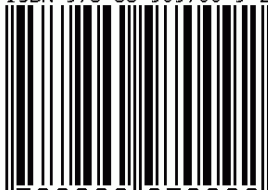
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## Popular Participation through ICTS in Lawmaking Processes

Frederico de Carvalho Figueiredo

### Abstract

The participation of the population in the drafting, analysis, and evaluation of State rules can improve their efficacy and make its contents more realistic. It also is a democratic device for control by the people, viewing and reviewing the laws debated in a certain State. This paper aims to analyze theoretically the possible influence of participation using ICTs in the lawmaking process, under the scope of Legistics. Thus, the participation in lawmaking can be a huge advance in the creation of laws. Especially using ICTs, enabling more and more people to be part of the process – be it as an information provider, reviewer, evaluator or proponent. This paper proposes a literature review, and based on the authors' considerations, points the benefits and issues present in the digital participation in lawmaking. As results, the paper points the benefits of public participation in lawmaking process, the ease provided by ICTs in this participation, and probable results of that.

**Keywords:** Popular Participation Through ICTs In Lawmaking Processes

### Introduction

The search for regulatory quality should always be supported by the State, for the purpose of acting in accordance with the results envisioned by the law. The ease of understanding of the law and the consensus towards its necessity are factors that contribute to the legislative effectiveness.

The regulatory quality also permeates the connection between its *raison d'être* and the pragmatic change in society. The legislative assessment guarantees a feasibility analysis of the law before it was even proposed, therefore monitoring its outcomes, which determine whether or not that specific law is suitable, according to its purposes (SOARES, 2002).

Palmirani (2008) shows many defects in the lawmaking, including language errors; misspelling; tacit and implicit repeals, which difficult the relationship between the law and the legal system; generic terms and norms *et cetera*. These flaws could be avoided by assuring greater care in legislative drafting and the participation of other parties interested in its formulation. Romano (2003) also points out formal aspects that result in loss of regulatory quality, such as semantic or syntactic ambiguities, contradictions and inaccuracy regarding the recipient of the law. Pagano (2004) also points out inflation and legislative pollution as contemporary relevant factors in counterproductive lawmaking.

Considering the above, this work seeks popular participation tools for combating the legislative shortcomings. The use of information systems and communication technologies aim to streamline the lawmaking process, both from formal and material perspectives. Popular participation, that is to say, allowing those who are interested parties in a legislative draft to exercise their rights to participate and influence the final decision, is also positive to the law, making it more realistic and closer to society.

This work uses the qualitative methodology, realizing a literature review of relevant authors who address these themes. Based on their considerations the benefits of the digital participation in the lawmaking process will be identified.

The results are favorable to greater permissibility of popular participation, which may be encouraged by the use of digital tools through information and communication technologies.

### About the Regulatory Quality

On the one hand, the legal innovation must take as fundamental elements the reasons for the existence of the rule itself and its relationship with the current legal system. The disordered legal system, disconnected from reality, creates contradictory situations within the legal set (SOARES, 2007; BROCHADO, 2010). Faced with the imposition of a myriad of requirements and regulations, the inevitable results are a systematic instability in the legal system and legal uncertainty.

On the other hand, one of the recipients of the legislation – the very person who will be affected by the rule – is a mere spectator of the legislative process. This person, who has great interest in the analysis of the rule, on whom it will realize its effects, is unaware of its content and, occasionally, not even understand what is been said on that law, which ceases to impose its effects and change the reality as desired by the legislator.

According to Bobbio (1997), the search for connection between participation and representation is feasible and should be encouraged, since it would promote citizen's greater immersion in the public decisions while maintaining the stability due to representation.

Although the Constitution, in Article 14, establishes the indirect representation model in Brazil, the instruments listed there are completely underutilized.

As Bonavides (2001, p. 117) states, "Article 14 of the 1988 Constitution is part of the bedrock of our political system, which is based on two dimensions: the representative dimension, operating since the promulgation of the Supreme Law, for about a decade; and the direct democracy; both written expressly in the First Article of the Fundamental Statute of the Federative Republic of Brazil".

The popular participation in the lawmaking process is thus incipient in Brazil. Especially at the federal level, in which were applied only a plebiscite and a referendum in the whole democratic history of the country. The popular initiative, which represents the direct participation in lawmaking, is often taken over by congresspersons, who make it "their" proposal.

When the possibility of creating, editing and understanding laws is taken away from the population, it becomes not possible to show the interested parties the solution proposals for everyday problems. The logical consequence of treating citizens as mere spectators is the emergence of dilemmas and shortcomings in the legislation, especially regarding the relationship between its origin and effectiveness.

But such processes of participation are able "to create a bridge between the legal sphere (whose understanding is difficult for its recipients; nevertheless, it is presumed it is well known) and the social representatives of people's needs and aspirations, on which the legislator should work" (SOARES, 2002, p. 3). Hence the base-purpose-form relation of the legislative production is presented, which was already debated and whose importance was outlined earlier.

The participation also allows the population to play an important role, as they possess relevant knowledge and insider information on their area of interest and everyday life. The providing and subsequent use of such data for analyzing and defining decisions is an important activity of the citizens, promoting an exchange of information and acting in the debate (AURIGI, 2005).

Besides the mentioned tools, some countries have been developing new ways to enable the population participation in legal-legislative decisions. As a result of an ongoing democratization movement (Brazil is an example of it), these countries are trying new forms of management that enable citizen participation (SANTOS; AVRITZER, 2002).

It should be remembered that participation tools, in spite of being a dialogic and different process between interested parties – especially the citizen and the administration –, are still closely linked to the current system (SAMPAIO; ROBALLO, 2010). Accordingly, the perception of the influence, the respect for people's decision and the comprehensive implementation of their choice are mandatory for full involvement.

One of the forms of popular participation is the influence and acting in the legislative power. The making of better laws is deeply analyzed by the legal system, starting from the reasons for its creation, whether or not it is necessary and future effects, the social debate regarding its approval, among other things. Popular participation may improve these aspects, hence the legal quality.

The Legislative Drafting thus cares about the legal pragmatism, aiming at full legal application within the legal context (ATIENZA, 1989; MERCATALI; ROMANO, 2013). The legal effectiveness is ideologically related to consensus, proper motivation, and tools for legal observance. The material legislative drafting deal with the legislation content, while the formal legislative drafting deals with the linguistic and legal content of the rule (MORAND, 1999), always aiming at its effectiveness.

Another important aspect is the combination of the reason for creating that specific law with its expected effect, its achieved effect and the real and legal context in which it will be inserted. The impact of this new law must be viewed intrinsically, within its systemic analysis, and extrinsically, within its real context and generation of effects.

Not only the adequacy of the lawmaking is analyzed, but also its planning. The creation of rules should be viewed as a system that works effectively, realizing the purposes for which the law is created (SOARES, 2007). Such process imposes legislative limitations when editing rules, as well as the duty to assess the impacts of that law intrinsically and extrinsically (CASTRO, 2007; SOARES, 2007; DELLEY, 2004; SOARES, 2002). The importance of the legislative planning should be remembered especially because of legality, which is often translated into determinations and restrictions to citizens when not into rights and benefits.

The production of rules should be guided by the assessment of social problems and complaints, which would be evaluated by the legislative power. The search for the causes of the tension between reality as it is and reality as it should be must be regulated by legislative actions (SOARES, 2013; DELLEY, 2004). According to Castro (2007, p. 2), the prior legislative assessment, "subject of particular interest in this study, is the set of analysis of potential and actual results of legislation, made by means of a scientific method. It is characterized by being a systematic and assertive procedure to access and verify data relevant for the legislative purposes".

During the legislative process, there are various possibilities of action commonly found in lawmaking. Discussions among those who hold elected office constitute the backbone of the legislative creation. Nevertheless, the Executive's approval or veto and the recognition of judicial decisions are also legislative mechanisms (MENDES, 1992). The possibility of popular participation here, through the legislative adversarial proceedings, should be taken into account (SOARES, 2013), as it may participate directly, not through representatives, interfering in the lawmaking process (SOARES, 2002).

Finally, it should be performed an analysis *ex-post facto* in order to verify the effectiveness of that law in adjusting itself to the physical world (CASTRO, 2007; SOARES, 2007; DELLEY, 2004). The planning is completed in the inspection phase, in which are conducted researches on the adequacy of the law to a certain purpose determined before.

In a brief summary, these aspects deal with the material examination of the law. For the analysis of the regulatory quality, another aspect should also be thought, for a proper understanding and better interpretation by the legal operators.

The formal concern with the legislative instruments is due to its understanding by legal agents. The law is still within an isolated area that makes it difficult for citizens to understand its content. The writing is convoluted and long-winded, impede the comprehension of the law, which should appreciate the clarity and simplicity, ensuring its accessibility (HESPANHA, 2013).

It is clear that knowing that the text – and particularly the law – bear symbolic power, there is no intention to its complete rationalization (BOURDIEU 1986; HESPANHA, 2013). However, the aim is to make comprehension and understanding of the terms as wider as possible. After all, as Bobbio (2001) said, it is a set of words that carries a meaning.

The formal and material aspects form a circular model, in which ease of understanding and awareness of the law depend on and is influenced by its design and implementation.

In order to improve the legislative process, several countries have sought to standardize the lawmaking process. Canada, for example, released the "Federal Regulations Manual" and the "Statutes Repeal Act". The Organization for Economic Cooperation and Development (OECD) developed the "Guiding Principles for Regulatory Quality and Performance". Portugal has a book on "Regras de Legística a Observar na Elaboração de Actos Normativos da Assembleia da República". The European Union established a Council for drafting the "Mandelkern Group on Better Regulation Final Report". In Italy, they were created the "Regole e raccomandazioni per la formulazione tecnica dei testi legislativi" and the simplification laws.

Today, however, a gap can be seen between legislation drafters and the citizens, who are the target of the legislation. This detachment is a consequence of several factors, including the crisis of legitimacy of the representatives/managers in the current political context (FREY, 1996; TRECHSEL et al, 2003). A greater relationship between these spheres, allowing the popular participation in the lawmaking process, might lead to an increase in regulation quality, both formal and material (SOARES, 2007; BROCHADO, 2010; DELLEY, 2004; HESPANHA, 2013).

### **Information and Communication Technologies to Facilitate Participation**

The increasing use of information technologies, the ease of access to these mechanisms and the internet development demonstrate the importance of exchanging information, data, languages and symbols (SILVA, 2001). Authors agree that

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the use of ICTs and internet can change deeply and radically the democratic processes (LEVY, 1999; CASTELLS, 2002; PITTERI, 2007). The potential of this relationship is based on a non-hierarchical structure that favors interactivity, especially due to its interdisciplinary and fluid character (FREY, 2000). In particular, the development of computing law and public computing law (FINOCCHIARO, 1995, p.13, cited SOARES, 2002), regarding issues such as electronic debates and voting, supply and circulation of information, transparency and accountability.

For the achievement of electronic democracy, it is necessary to encourage the expression of problems and the development of solutions by the population itself. Furthermore, transparency and allowing interested parties to express their thoughts towards the rule increase the population's relevance and influence in decision process (LÉVY, 1999). Through online participation the political debate may be kept alive and genuine. The worldwide network has the ability to increase the accountability of politicians; connect people with similar ideas; and change the citizens' way of acting, which will become more demanding with the transparent governance.

The law – and thus the lawmaking – is inserted in the communicative rationality (HABERMAS, 1997; SANTOS, 2002); hence, it may greatly benefit from the communication technologies.

One of the examples of participatory processes in lawmaking is the Digital Participatory Budget. This tool allows citizens to decide how the public budget will be spent, including demands selected in the Annual Budget Law, before it is sent by the Executive (which has the power of initiative) to the Legislative. (FIGUEIREDO, 2010). This mechanism allows popular activity in the material part of the law.

But the digital activity of the population has bottlenecks, which are actually another aspect of social exclusion. Citizens, companies and various stakeholders should be able to access and evaluate the information. A set of skills is still required to enable the relationship between people and the new participatory model. The Government should, therefore, provide mechanisms to facilitate this interaction, reducing the differences between those who have the means and knowledge to use the digital city and those who do not (CRUZ-JESUS; OLIVEIRA; BACAO, 2012; WONG; FUNG; LAW; LAM; LEE, 2009; DEURSEN; DIJK, 2010). Accessing technology and information means to be part of the new society, that is to say, the information society.

The participation mediated by ICTs has the comprehensiveness as its greatest asset. It is possible to obtain opinions of several people in a short time, making the lawmaking process more participatory.

Before the lawmaking process, there is one aspect to be analyzed: very need for regulation, as well as the presentation of alternatives to legislation. Social problems do not necessarily need to be solved through the publication of new laws and can be treated by infra-legal means, or even by actions of the population itself. The prior legal assessment (CASTRO, 2007) will be held by citizens themselves, assessing the need/use of that rule.

This assessment aims to determine whether there is a need for formulating new laws and, if it is necessary, which the required content is for solving the problems that originated these laws. The citizens may express themselves through mediated participation, determining whether and how such a law would achieve them, since they are its target.

Still in regard to the ex ante analysis of the law or lawmaking process but now in the material viewpoint of the document – the content analysis of the law –, the first item to be dealt with is whether the population will be able to participate in the making of that rule, that is to say, about the idea in which the rule is based and its expected results. The very creation of the law may be derived from citizen participation that brings to the lawmaking process the debate on community problems that must be addressed by the law.

Accordingly, creating opportunities to debate the problems of the population's everyday life, as well as the requirements that must be met by law would provide a lawmaking process more focused on the problems shown by the population, to ensure that the citizens themselves will be responsible for solving their own problems.

Citizens have access to information on the legislative framework through ICTs, that is to say, content that might affect their analysis of the need for legislation and the way it is executed. As an example, the municipal information about diseases by neighborhood might help the population in determining whether there is a need for new legislation that addresses this issue.

It also enables the distance participation, so it is possible to exercise citizenship even without the physical presence. This makes the debate wider, given the number of participants and the variety of arguments that such diversity provides.

The debate continues during the legislative approval process, in which the legislative adversarial proceedings will be carried out, that is to say, the contrast of ideas about the proposition. ICTs, then, allow the expansion of the debate, in order to allow the manifestation of the different layers of society. The possibility of the population to present arguments and be heard using its own voice goes beyond mere parliamentary discussion, as a clear and relevant manifestation of democracy written in the Constitution of the Republic.

This same population that suffers the impact of the rules can provide information on their effectiveness. The provision of data by the population allows the analysis of the actual enforcement of the law and its practical effects. The use of digital mediation allows more and more people to provide the necessary information for the legislative assessment. A good example of providing information for the analysis of the rules is the use of internet for filing police reports online, which allows (in relation to this subject) the assessment of the criminal law based on information provided by the population.

Regarding the formal part of the legislation, a broad consultation of a bill may facilitate the identification of difficulties in the interpretation of the population at some point of the text. Another possibility is to use a less elaborated writing, which has been a characteristic of legislation for a long time (WYDICK 1978; HESPANHA, 2013). The use of a simpler and more accessible vocabulary provides a better understanding of the rights, restrictions, and procedures established by the law.

When suggesting changes in laws that have already been created – with an *ex-post facto* analysis (CASTRO, 2007; SOARES, 2007; DELLEY, 2004), popular participation may demonstrate aspects of the law itself that did not match what was intended by the legislative power. The citizens are an important source of data for performing an analysis of the legislation, since they see whether the rule is effective or not during their daily routine – especially those suffering its effects.

It is noteworthy that the political exclusion would diminish with the possibility of digital participation in lawmaking process. The digital divide goes beyond the inability to search for information and communicate, interfering with the relationship between the State and the citizen.

Searching for inserting the population in the digital model of actual society and democracy that it follows (LÉVY, 1999) is a duty of the State, thus allowing citizenship, which is also determined by the possibility of action with the State, to be more effective. Digital inclusion is a condition without which the digital participation is impossible.

### Final Considerations

This study aimed to examine the possibility of using information and communication technologies in the context of popular participation in the lawmaking process. It was therefore based on literature review, in order to collect data for dealing with this theme.

The benefits that the popular participation may bring were identified; citizen participation through ICTs is relevant due to the number of people that may be achieved, thus participating in the process. The provision of information and the possibility of criticism and opinions about a particular subject makes the law better, due to the ease of inserting information and obtaining the necessary data for analysis of a particular rule.

Finally, the necessary aspects for the effective digital participation in the lawmaking process (besides the skills necessary for the use of digital tools) are digital inclusion and transparency, in order to make possible the effective assessment and legislative planning.

As it is a theoretical work, conducting new research on this topic will be of great importance for the area. Empirical studies, especially, may analyze whether all the theoretical background presented here would be confirmed in the practice of digital participation in lawmaking and legal monitoring processes.

### References

- [1] ATIENZA, M. (1989) Contribución para una teoría de la legislación. In: Doxa, n. 6. Retrieved from: <[http://bib.cervantesvirtual.com/servlet/SirveObras/01361620813462839088024/cuaderno6/Doxa6\\_21.pdf#search=contribucion+a+una+teoria"&page=13](http://bib.cervantesvirtual.com/servlet/SirveObras/01361620813462839088024/cuaderno6/Doxa6_21.pdf#search=contribucion+a+una+teoria)> .
- [2] AURIGI, A. (2005) Competing urban visions and the shaping of the Digital City. In: Knowledge, Technology, & Policy, v. 18, n. 1, p. 12-26
- [3] BOBBIO, N. (2001) Teoria da norma jurídica. Bauru: Edipro
- [4] BOBBIO, N. (1997) O futuro da democracia. São Paulo: Paz e Terra

- [5] BONAVIDES, P. (2001) Teoria constitucional da democracia participativa. São Paulo: Malheiros
- [6] BOURDIEU, P. (1986). La force du droit. Éléments pour une sociologie du champ juridique. In: Actes de la recherche en sciences sociales. v. 64, set
- [7] BRASIL. Constituição da República Federativa do Brasil. Brasília: Senado Federal, 1988.
- [8] BROCHADO, M. (2010) Ética e as relações entre Estado, Política e Cidadania. In: Cadernos da Escola do Legislativo. Belo Horizonte, v. 12, n. 19, p. 57-82, jul-dez
- [9] CASTELLS, M. (2002) A sociedade em Rede. São Paulo: Paz e Terra, 2002.
- [10] CASTRO, A. V. J. (2007) Legística e modelos de avaliação legislativa: uma proposta para o aprimoramento da produção normativa municipal de Belo Horizonte. Belo Horizonte: Assembléia Legislativa de Minas Gerais, 2007
- [11] CRUZ-JESUS, F.; OLIVEIRA, T.; BACAO, F. (2012) Digital divide across the European Union. Information and management, Lisboa, v. 49, p. 278-291
- [12] DELLEY, J. D. (2004) Pensar a Lei. Introdução a um procedimento metódico. In: Cadernos da Escola do Legislativo. Belo Horizonte, v. 7, n. 12, p. 101-143, jan-jun
- [13] DEURSEN, A. V.; DIJK, J. V. (2010) Internet skills and the digital divide. New Media and Society. 13 (6), p. 893-911
- [14] FIGUEIREDO, F. C. (2010) Orçamento Participativo Digital em Belo Horizonte-MG: um estudo exploratório. Dissertação de Mestrado. Lavras: UFLA
- [15] FREY, K. (1996) Crise do Estado e Estilos de Gestão Municipal. In: Lua Nova. São Paulo, v. 37, p. 107-138
- [16] FREY, K. (2000) Governança eletrônica: experiências de cidades europeias e algumas lições para países em desenvolvimento. In: Revista IP – Informática Pública, Belo Horizonte, v. 2, p. 31-48, maio
- [17] HABERMAS, J. (1997) Direito e democracia. Rio de Janeiro: Tempo Brasileiro
- [18] HESPANHA, A. M. (2013) Leis bem feitas e leis boas. In: Revista do Instituto de Direito Brasileiro. Lisboa, n. 1, p. 619-642
- [19] LÉVY, P. Cibercultura. (1999) São Paulo: Ed. 34
- [20] MENDES, G. F. (1992) O apelo ao legislador – Appellentscheidung – na prática da Corte Constitucional Federal Alemã. In: Revista de Informação Legislativa. Brasília, v. 29, n. 114, abr-jun
- [21] MERCATALI, P.; ROMANO, F. (2013) I documenti dello stato digitale. Regole e tecnologie per la semplificazione. Edizioni Studio Ad. Es Il Galletto, Borgo San Lorenzo, 2013
- [22] MORAND, C. A. (1999) Formes et fonctions de l'évaluation législative. In: LeGes, p. 79-104, jul-dez 1999. Retrieved from: <<https://www.google.com.br/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF8#q=Formes+et+fonctions+de+L%+C3%A9valuation+législative>>.
- [23] PAGANO, R. (2004) Introduzione alla legistica: L'arte di preparare le leggi. 3 ed. Milano: Giuffrè
- [24] PALMIRANI, M. (2008) Informatica legislativa: fondamenti e prospettive. Bologna: Università di Bologna, Facoltà di Giurisprudenza
- [25] PITTÈRI, D. (2007) Democrazia Elettronica. Bari: Laterza
- [26] ROMANO, F. (2003) Drafting legislativo e controllo di qualità: esperienze e proposte. Rapporto Tecnico 3. Firenze: Istituto di Teoria e Technique dell'informazione Giuridica
- [27] SAMPAIO, R. C.; ROBALLO, J. H. M. (2010) A internet como incremento da participação offline: uma proposta de classificação para orçamentos participativos online. Cadernos PPG-AU/UFBA, v.9, ed especial
- [28] SANTOS, B. S. (2002) A crítica da razão indolente: contra o desperdício da experiência. Para um novo senso comum: A ciência, o direito e a transição paradigmática. 4 ed. São Paulo: Cortez
- [29] SANTOS, B. S.; AVRITZER, L. (2002) Para ampliar o cânone democrático. In: SANTOS, B. S. (Org.). Democratizar a democracia: os caminhos da democracia participativa. Rio de Janeiro: Civilização Brasileira
- [30] SILVA, F. C. da. (2001) Habermas e a esfera pública: reconstruindo a história de uma idéia. Revista Sociologia, Problemas e Práticas, São Paulo, v. 41, n. 35, p. 117-138, abr
- [31] SOARES, F. M. (2007) Legística e desenvolvimento: A qualidade da lei no quadro da otimização de uma melhor legislação. In: Revista da Faculdade de Direito da UFMG. Belo Horizonte, n. 50, p. 124-142, jan-jul
- [32] SOARES, F. M. (2013) Notas introdutórias sobre elaboração legislativa. Raízes e boas práticas entre Brasil e Canadá. In: Revista da Faculdade de Direito da UFMG. Número especial: Jornadas Jurídicas Brasil-Canadá, p. 153-168
- [33] SOARES, F. M. (2002) Produção do Direito e conhecimento da Lei a luz da participação popular e sob o impacto da tecnologia da informação. Tese de Doutorado. Belo Horizonte: Faculdade de Direito da UFMG
- [34] TRECHSEL, A.; KIES, R.; MENDEZ, F.; SCHMITTER P. (2003) Evaluation of the Use of New Technologies in Order to Facilitate Democracy in Europe. Strasbourg, European Parliament, STOA
- [35] WYDICK, R. C. (1978) Plain english for lawyers. California Law Review, v. 66, n. 4. Retrieved from: <<http://scholarship.law.berkeley.edu/californialawreview/vol66/iss4/3>>.
- [36] WONG, Y. C.; FUNG, J. Y. C.; LAW, C. K.; LAM, J. C. Y.; LEE, V. W. P. (2009) Tackling the digital divide. In: British Journal of Social Work, v. 39, p.754-767

## The Heteroscedasticity Impact on Actuarial Science: Lee Carter Error Simulation

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### Abstract

Life insurance companies deal with two fundamental types of risks when issuing annuity contracts: financial risk and demographic risk. As regards the latter, recent work has focused on modelling the trend in mortality as a stochastic process. A popular method for modelling death rates is the Lee-Carter model. In this paper we give an overview of the Lee Carter model and the feasibility of using it to construct mortality forecast for the population data. In particular, we focus on a sensitivity issue of this model and in order to deal with it, we illustrate the implementation of an experimental strategy to assess the robustness of the LC model. The next step, we experiment and apply it to a matrix of mortality rates. The results are applied to a pension annuity. There are investigating in particular the hypothesis about the error structure implicitly assumed in the model specification, after having assume that errors are homoscedastic. Analyzing the model it is estimated that the homoscedasticity assumption is quite unrealistic, because of the observed pattern of the mortality rates showing a different variability at different ages. Therefore, there is an emerging opportunity to analyze the strength of predictable parameter. The purpose of this study is a strategy in order to assess the strength of the Lee-Carter model inducing the errors to satisfy the homoscedasticity hypothesis. The impact of Lee Carter model on various financial calculations is the main focus of the paper. Furthermore, it is applied it to a matrix of mortality rates including a pension rate portfolio. The Albania model with the variables of death and birth is shown on this paper taken in consideration the Lee Carter Error.

**Keywords:** Lee-Carter model, mortality forecasting, Life Expectancy at Birth, Experimental Strategy, Singular Value Decomposition (SVD), Homoscedasticity.

### 1 Introduction

Life expectancy depends on several factors, which are age, gender, geographical region, and social class. Although some hypotheses for a long term change to the trend in life expectancy, due to causes such as obesity and worsening environmental conditions, it seems that life expectancies are following, and are likely to continue to follow, an increasing trend. It is assumed that less clear is the shape of this trend, particularly in light of two elements which emerge from empirical observations: life expectancies have increased at a faster rate than anticipated and the uncertainty in the projections of life expectancy increases as the time horizon increases. These ingredients are a source of concern to the financial institutions which provide financial products to the elderly such as pension annuities. If these trends are not considered, this type of contract will last longer than expected, bringing higher costs to these institutions.

The situation can be summarized by saying that contracts like pension annuities are seriously exposed to longevity risk, and this exposure needs to be understood and managed. Further, it is well known that insurers generally use their internal models when major business decisions are to be made; for example pricing, product development and business planning all require the use of a pre-specified internal model.

After this, it can see that internal models play an important role in current actuarial practice. From a strict risk analysis viewpoint, the different risk aspects connected with the forecasting of future lifetimes arise from both accidental and systematic deviations of the actual data from their expected values. The longevity risk component is due to the systematic deviations of the deaths from the anticipated values, while the accidental variability in mortality causes a risk strongly influenced by the portfolio size. Working with a portfolio large enough to captivate the accidental demographic uncertainty,

the demographic risk can be considered as constituting the systematic component and this is the main element that interacts with the risk arising from the variability in financial markets, the financial risk. The effect of both of these risks may be significant if we are referring to portfolios of life contracts of long duration such as pension annuities, which are characterized also by a multiplicity of payments. The consideration of the systematic aspect of the demographic risk is deepened in this paper by our focusing on the evolution over time of mortality rates. Continuing improvement in adult age mortality and in particular, during the most recent 30 years, this decreasing trend has been accelerating. Potential discontinuities in longevity trends have been taken into account by some demographers but most forecasters seem to think that discontinuities or jumps with respect to recent trends are to be considered extremely unlikely.

The Lee-Carter model (Lee & Carter, 1992) has become a popular method for modelling and forecasting the trends over time in death rates: the main reasons are that it outperforms other models with respect to its prediction errors and that it is easy to implement. This methodology has become widely used in years and there have been various extensions and modifications proposed in order to attain a broader interpretation and to capture the main features of the dynamics of mortality rates, e.g. the log-bilinear Poisson version of the Lee-Carter model. In order to improve the survival probability outputs from the point of view of measuring uncertainty and hence longevity risk, recent approaches have used simulation procedures applied to the Lee-Carter family of models.

These studies provide prediction intervals for the forecasted quantities that are derived by using simulation techniques: this is an important feature because of the non-linear nature of the quantities under consideration. The approaches are based on the bootstrap methodology for obtaining more reliable and accurate mortality projections and utilize the semi parametric bootstrap based on the Poisson distribution.

Furthermore, by nesting the original Poisson LC within the bootstrap with stratified sampling, we seek to reduce the approximation error for the statistics of interest. A sampling variance reduction approach for bootstrap mortality estimation is developed and analyzed in comparison with the bootstrap procedure as in Brouhns et al., 2005 (referred to herein as the Standard Procedure or SP). In this framework, the aim of the paper is to perform a new approach for describing the survival phenomenon by means of an experimental simulation approach applied to the LC model: the Stratified Sampling Bootstrap (SSP).

The approach provides good results compared with the Standard Bootstrap and the Iterative Procedure (IP) proposed by Renshaw & Haberman (2003c) in respect of the Italian population. It is assumed that the demographic system for modelling a portfolio cash flow distribution impacts on key quantities such as technical reserves, surplus and funding ratios and it affects some of the choices in the management of pension plans.

The analyze in this paper has been focused on the funding ratio, defined as the ratio between the market value of the assets and that of the liabilities at a certain time, and is chosen as a measure of the solvency of the insurance portfolio at that time. In particular, the purpose of this study, considering the results as measures of the cost of increased longevity, is to have a look on the financial implications of the improvement over time in mortality rates on the funding ratio. In this analysis, the financial risk is stochastically modelled and interacts with the demographic risk.

Although recent econometric researchers highlight that a certain degree of correlation between these two sources of risk may exist, the risks are assumed to be independent in both the classic actuarial context of pricing and reserving in life insurance. In this paper, valuations are performed at the time of issue on the basis of the financial and demographic information and are highly sensitive to the strength of the longevity phenomenon.

Survival modelling is required, from the pension plan point of view, for the estimation of the premiums expected to be received during the accumulation period up to retirement age, and of the benefits expected to be paid during the period from retirement age until the death of the policyholder. In the numerical examples, it will discussed funding ratio values using the SSP and compare them with those that result from the other two techniques under consideration: SP and IP, in a context in which interest rates are stochastically modelled. After that, the analysis is completed with the calculation of the risk arising from the uncertainty in the choice of the simulation approach: this is allowed for by assigning probabilities to the choice of each of the three different approaches, in light of the subjective degree of reliability that the insurer attaches to each method.

The contextual of the research is based on the bilinear mortality predicting methods. These methods are taken into account to describe the enlargements in the mortality trend and to project survival tables. The focus is based on Lee-Carter method

for modelling and forecasting mortality. In particular, a sensitivity subject of this model and in order to deal with it, it is illustrated the implementation of an experimental strategy to assess the robustness of the LC model. The results are applied to a matrix of mortality rates in a pension annuity portfolio.

The LC method is an influential approach to mortality forecasting rate in different population. In analyzing these forecasting models, it is allowed to ensure that the most appropriate random process is used for each mortality model. In this study it is consider a variety of processes including multivariate, autoregressive process etc. The data included in this paper are from Italian pension annuity portfolio and Albania data mortality and birth. Below you may find the traditional LC model analytical expression:

$$\ln(M_{x,t}) = \alpha_x + \beta_x K_t + E_{x,t} \quad (1)$$

This equation describe the logarithm of a time series of age-specific death rates  $m_{x,t}$  as the sum of an age-specific parameter that is independent of time  $\alpha_x$  and a component given by the product of a time-varying parameter  $K_t$ . In this expression it is clearly reflecting the general level of mortality and the parameter  $\beta_x$  who is representing the trend of mortality at each age of group, how highly or slowly is generated when the general level of mortality changes.

The term  $E_{x,t}$  is the error term, assumed to be homoscedastic with mean 0 and variance  $\sigma^2$ . Now it is calculated the same equation (1), if  $M_{x,t}$  is the matrix holding the mean centered log-mortality rates. It is seen that the LC model can be expressed as per below:

$$M_{x,t} = \ln(M_{x,t}) - \alpha_x = \beta_x K_t + E_{x,t} \quad (2)$$

Following Lee Carter model (LC), the parameters  $\beta_x$  and  $K_t$  can be estimated according to the Singular Value Decomposition (SVD) with suitable normality restrictions. The LC model incorporates different sources of uncertainty in the demographic model and uncertainty in forecasting. The former can be incorporated by considering errors in fitting the original matrix of mortality rates, while forecast uncertainty arises from the errors in the forecast of the mortality index. In our contribution, we deal with the demographic component in order to consider the sensitivity of the estimated mortality index. In particular, the research consists in defining an experimental strategy to force the fulfilment of the homoscedasticity hypothesis and evaluate its impact on the estimated  $K_t$ .

## 2. Lee Carter Model specification

The experimental strategy introduced above, with the aim of inducing the errors to satisfy the homoscedasticity hypothesis, consists in the following phases. The error term can be expressed as follows:

$$E_{x,t} = M_{x,t} - \beta_x K_t \quad (3)$$

As the difference between the matrix  $M_{x,t}$ , referring to the mean centered log mortality rates and the product between  $\beta_x$  and  $K_t$  deriving from the estimation of the Lee Carte model (LC). The successive step consists in exploring the residuals by means of statistical indicators such as: range, interquartile range, mean absolute deviation (MAD) of a sample of data, standard deviation, box-plot, etc. After that, it proceed with finding those age groups that show higher variability in the errors.

Once it is explored the residuals  $E_{x,t}$ , it may find some non-conforming age groups. For each selected age group, it is possible to reduce the variability by dividing the entire range into several quantiles, leaving aside each time the fixed  $\alpha\%$  of the extreme values. It is replicate each running under the same conditions a large number of times (i.e., 1000). For each age group and for each percentile, it is defined an error matrix. The fitted parameter figures strongly depend on the constraints enforced, which becomes more obvious in the graphs that follow. This implies that the constraints are a determining factor when deciding what time series process to use for generating mortality scenarios. In a multi-population model, we expect a certain behavior from its parameters.

In a perfect situation, the common parameters should be able to capture the true global mortality trend, in both age and time, amongst the populations as a whole. If the underlying philosophy of the model is correct, then we would expect that the country-specific period effects all data around some constant level in the long term. Significant differences from this level, in either range or shape would mean that this particular population is somehow different from the other populations

and there should be a reason for this behavior. The maximum-likelihood estimation is highly influenced by the population size and the countries with bigger size should have a higher impact when estimating the common mortality parameters. The successive running give more and more homogeneous error terms.

First we have the Lee Carter model, where it is estimated the parameters  $\alpha_k$ ,  $\beta_x$  and  $K_x$ . The parametrization of variables is like  $\sum_k \alpha_k = 0$  and  $\sum_{k=0}^n \alpha_k^2 = 1$ . Under this model, mortality projections are obtained by projecting a time series for  $k_j$ . By way of this experiment, it is investigated the residual's heteroscedasticity deriving from two factors: the age group effect and the number of altered values in each age group. In particular, the focus is to determine the hypothetical pattern of  $k_t$  by increasing the homogeneity in the residuals.

Thus, under these assumptions, it is analyzed the changes in  $k_t$  that can be derived from every simulated error matrix. In particular, at each running it is obtained a different error matrix  $Ex,t$ , which is used for computing a new data matrix  $Mx,t$ , from which it is possible to derive the correspondent  $k_t$ . To clarify the procedure analytically, we will see the following relation:

$$Mx,t - Ex,t = Mx,t - b_x K_t \quad (4)$$

where  $Mx,t$  is a new matrix of data obtained by the difference between  $Mx,t$  (the matrix holding the raw mean centered log mortality rates) and  $Ex,t$  (the matrix holding the mean of altered errors). From  $Mx,t$ , if  $\beta_x$  is fixed, it is obtain the  $k_t$  as the ordinary least square (OLS) coefficients of a regression model. The procedure is replicated by considering further non-homogenous age groups with the result of obtaining at each step a new  $k_t$ . It is running a graphical exploration of the different  $k_t$  patterns explained below.

Thus, it is plot the experimental results so that all the  $k_t$ 's are compared with the ordinary one. Moreover, the slope effect of the experimental  $k_t$  is compared through a numerical analysis.

The experiment is focused on the Italian data matrix in log mortality rates as an experiment, for the male population from 1950 to 2000. In particular, the rows of the matrix represent the 21 age groups [0], [1–4], [5–9], ..., [95–99] and the columns refer to the years 1950–2000. The procedure consists of an analysis of the residuals' variability through some dispersion indices which help to determine the age groups in which the model hypothesis does not hold. It is noticed that the residuals in the age groups 1–4, 5–9, 15–19 and 25–29 are far from being homogeneous.

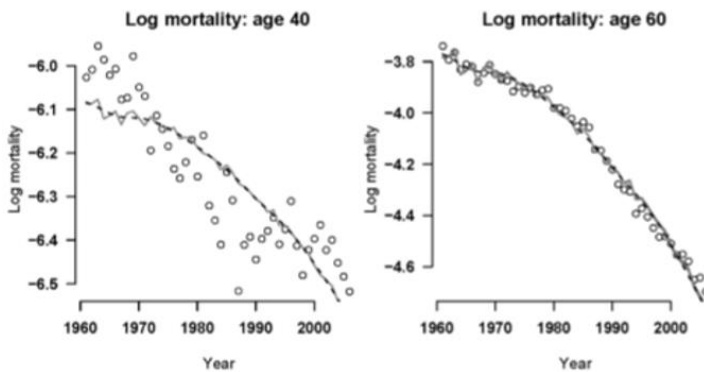
Thus, the age groups 1–4, 15–19, 5–9, 25–29 will be sequentially, and according to this order, entered in the experiment. Alongside the dispersion indices, it is provided a graphical analysis by displaying the box plot for each age group, where on the x-axis the age groups are reported and on the y-axis the residuals' variability. If we look at the age groups 1–4 and 15–19 can notice that they show the widest spread compared to the others. In particular, we perceive that for those age groups the range goes from -2 to 2. For this reason, there was explore to what extent the estimated  $k_t$  are affected by such a variability.

A way of approaching this issue can be found by means of the following replicating procedure, implemented in a Mat lab routine. For each of the four age groups it is substitute the extreme residual values with the following six quantiles: 5%, 10%, 15%, 20%, 25%, 30%. Then it is generated 1000 random replications (for each age group and each interval). From the replicated errors (1000 times  $\times$  4 age groups  $\times$  6 percentiles) it is compute the estimated  $k_t$  ( $6 \times 4 \times 1000$  times) and then the 24 averages of the 1000 simulated  $k_t$ . The 24,000 estimated  $k_t$  through a Plot-Matrix, representing the successive age groups entered in.

Age	IQ Range	MAD	Range	STD
0	0.107	0.059	0.300	0.075
1-4	2.046	0.990	4.039	1.139
5-9	1.200	0.565	2.318	0.653
10-14	0.165	0.083	0.377	0.099
15-19	1.913	0.872	3.615	1.007
20-24	0.252	0.131	0.510	0.153
25-29	0.856	0.433	1.587	0.498
30-34	0.536	0.250	1.151	0.299
35-39	0.240	0.186	0.868	0.239
40-44	0.787	0.373	1.522	0.424
45-49	0.254	0.126	0.436	0.145
50-54	0.597	0.311	1.290	0.367
55-59	0.196	0.151	0.652	0.187
60-64	0.247	0.170	0.803	0.212
65-69	0.207	0.119	0.604	0.147
70-74	0.294	0.171	0.739	0.202
75-79	0.230	0.117	0.485	0.133
80-84	0.346	0.187	0.835	0.227
85-89	0.178	0.099	0.482	0.124
90-94	0.307	0.153	0.701	0.186
95-99	0.071	0.042	0.220	0.051

Table 1 Different dispersion indices to analyze the residuals variability (Source: Authors D'Amato, Russolillo)

After this analyze we can see the crude mortality rates and the model fits under the various models. The crude mortality rates are shown as open circles, while the original Lee-Carter parameters are shown as a dark grey line. The DDE parameters are shown by a light grey line and the CR parameters are shown by a dashed line. The original Lee-Carter parameters are largely obscured by the DDE line, due to them being almost completely co-incident, i.e. the LC and DDE fits are almost identical. As we see, at the age 40 the log mortality is more dispersed considering the log mortality at 60, 70 and 80. At the years 1960-1980 the Lee carter rates and DDE rates are distant from each other, while in recent years this curbs tends to be closer.



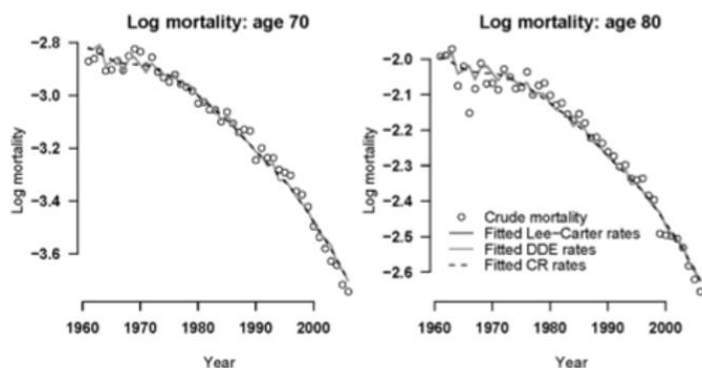


Fig.1 Log mortality at selected ages the dark grey line for original Lee-Carter parameters is largely obscured by the DDE line due to them being almost completely co-incident, i.e. the LC and DDE fits are almost identical (Source: Authors Richards, Currie)

Parameter plots for  $ax$ ,  $bx$  and  $ky$  (left column), and the same parameters after linear adjustment (right column); the original Lee-Carter parameters are shown as solid dots, while the DDE parameters are shown by a solid line and the CR parameters are shown by a dashed line; the linear-adjusted plots show the same coefficients on the left after subtracting a fitted straight line; they show, for example, that the pattern of  $ax$  by age is not as linear as it seems (ONS data) the original Lee-Carter model. In each case there is an obvious smooth pattern in the parameters, hence the extension of the DDE and the CR models to smooth  $bx$  (DDE and CR) and  $ky$  (CR only). The crude mortality rates are shown as open circles, while the original Lee-Carter parameters are shown as a dark grey line.

The DDE parameters are shown by a light grey line and the CR parameters are shown by a dashed line. The original Lee-Carter parameters are largely obscured by the DDE line, due to them being almost completely co-incident, i.e. the LC and DDE fits are almost identical. The projected log-mortality at age 65 under the DDE and CR approaches. While the central projections are very different, we can see that the confidence bounds substantially overlap, suggesting that the projection from one model is quite consistent with the projection from the other. It is interesting that the original Lee-Carter model has a confidence area which is essentially the more pessimistic half of the confidence area for the CR model. One notable feature is that the CR model has a much wider confidence interval.

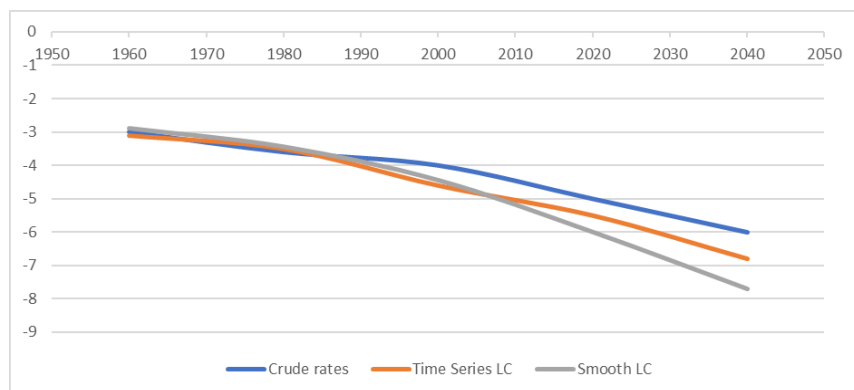


Fig.2 Mortality forecast at age 65 with 95% confidence intervals; the solid grey line is the time-series Lee-Carter forecast, together with shaded 95% confidence area; the dashed line is the smoothed-Lee-Carter forecast, together with 95% confidence bounds. (Source: Authors D'Amato, Russolillo)

In the figure we see that from 1960 to 2010, Crude rates, Time series LC and Smooth LC tend to be closed, without dispersion from each other, while after 2010 this curbs tends to go in the separate mode.

In contrast, with smaller data sets it is hard to prove the existence of more complicated patterns, thus leading to only simplistic models being fitted with narrow confidence bands, which might give an illusion of certainty. This paradox is discussed in greater detail in CMI (2005).

In below we can analyze the graph with Albanian data population. As we see the difference data birth from death is extremely lower in the recent years.

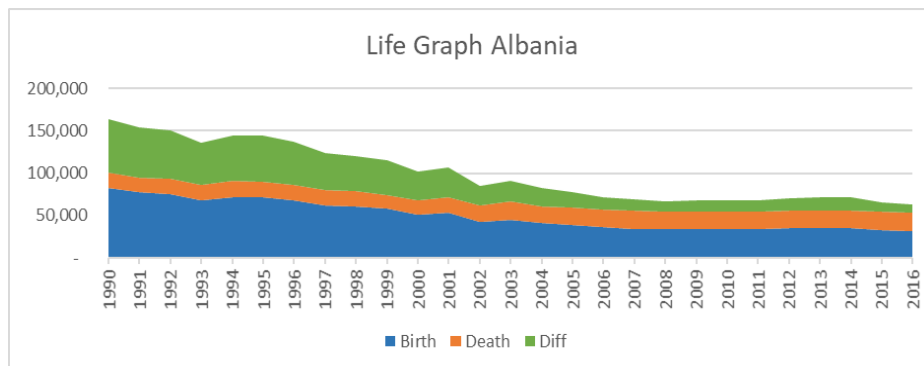


Fig.3 The graph of Albania population- birth and death per years (Source: INSTAT, Albania, O. Idrizi analyze)

From the graph we can clearly identify that the number of death, taking in consideration the number of birth is increased with a difference from 63,932 to 10,345 (birth – death). We have also analyzed that the number of divorce considering the marriage is lower with years.

This study include information by different institutions like Ministry of Finance, public and private pension institutes, INSTAT (Statistic institution) and other institutions serving in this field. It is analyzed the economic development of the country, as well human resources, social, economic and natural, in the economic development; to assess the sources of contributions and the contributors rights; to study the performance of the social security system along transition period with a view to identifying obstacles and ways to overcome them; to provide a clear picture of the demand for development of the pension market.

Pension system in Albania is facing a wide variety of interrelated problems. Albania has experienced a high level of informal labor markets as the contributions are low and this situation has brought to limited income from the wage contributions within the country itself. A large percentage of the working population is not making contributions and there are fewer workers that support the older age even nowadays.

For instance, the 'urban' people have to pay high contributions for limited pensions and non-urban people pay low contribution to take low pensions, which is overall relatively high in comparison to what they should pay. Furthermore, low rates of participation in the system suggests that when these workers retire a lower percentage of the elderly which will be covered by the pension system. Significantly, when workers with few contributions reach the retirement age, they will be ineligible for benefits, which show an increase of the number of elderly facing poverty in the nearer future. According to the data presented by the World Bank, between 35 to 50 percent of the future elderly will have no pensions, compared to nowadays where almost all elderly persons can set-up and collect pensions.

The estimated parameters at the Table 2 are shown in Figure3.

	Birth	Death	Diff
1990	82,125	18,193	63,932
1991	77,361	17,743	59,618
1992	75,425	18,026	57,399
1993	67,730	17,920	49,810
1994	72,179	18,342	53,837
1995	72,081	18,060	54,021
1996	68,358	17,600	50,758
1997	61,739	18,237	43,502
1998	60,139	18,250	41,889
1999	57,948	16,720	41,228
2000	51,242	16,421	34,821
2001	53,205	19,013	34,192
2002	42,527	19,187	23,340
2003	45,313	21,294	24,019
2004	40,989	20,269	20,720
2005	38,898	20,430	18,468
2006	35,891	20,852	15,039
2007	34,448	20,886	13,562
2008	33,445	20,749	12,696
2009	34,114	20,428	13,686
2010	34,061	20,107	13,954
2011	34,285	20,012	14,273
2012	35,473	20,870	14,603
2013	35,750	20,442	15,308
2014	35,760	20,656	15,104
2015	32,715	22,418	10,297
2016	31,733	21,388	10,345

Table 2 Albania population data on birth and death per years (Source: INSTAT, Albania, O. Idrizi analyze)

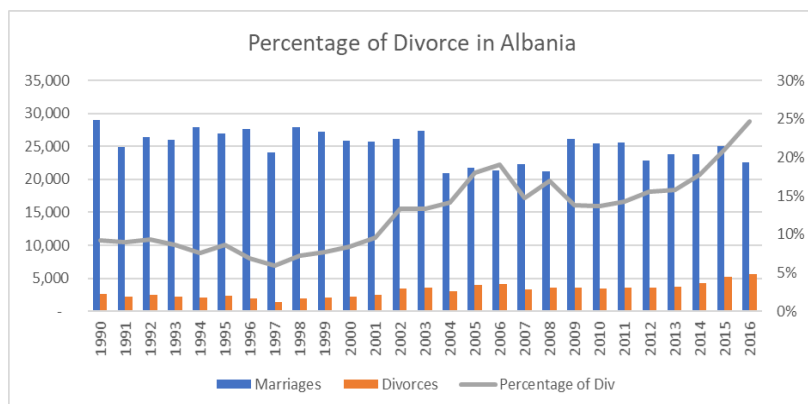


Fig.4 Graph of marriage and divorces in Albania population (Source: INSTAT, Albania, O. Idrizi analyze)

The age group and the different percentiles effect the experiment in the four rows and the successive increment in the percentage of outer values.

It is noticed that the different  $kt$  behavior in the four rows as more age groups and percentiles are considered. For better interpretation of these results, it is strategized a synthetic view of the resulting average of the 1000  $kt$  under the 24 conditions and compared them with the series derived by the traditional LC estimation.

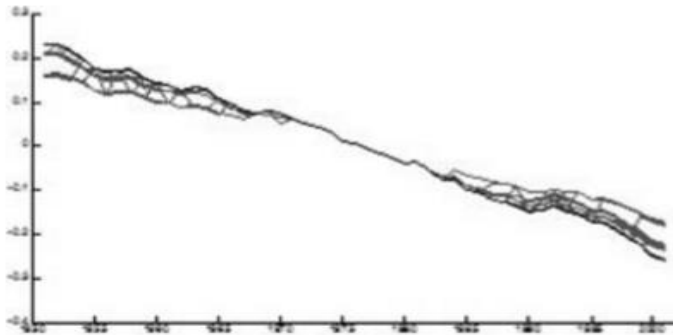


Fig. 5 .A comparison between the 24 averaged  $kt$  (in red) and the original one (in black) (Source: Authors D'Amato, Russolillo)

In Figure 5, where on the x-axis there are the years from 1950 to 2000 and on the y-axis there are the  $kt$  values, it is represent the 24,000  $kt$  grouped according to the 24 different experimental conditions. The impact on the  $kt$  series of the age groups change and of the increase of percentage of random values considered in the selected age groups. It is noticed that the  $kt$  derived by the experiment (in red) tends to be flatter than the original one (drawn in black), i.e., there are changes in homogeneity on the  $kt$  for each of the four age groups. By comparing the ordinary  $kt$  to the simulated ones, it is obtained information about the effect of the lack of homoscedasticity on the LC estimates. To what extent does it influence the sensitivity of the results? It is assumed that the more homogenous the residuals are, the flatter the  $kt$  is. From an actuarial point of view, the  $kt$  series reveals an important result: when it is used the new  $kt$  series to generate life tables, it is seen survival probabilities lower than the original ones. The effect of that on a pension annuity portfolio will be illustrated in the following application.

In this section, it is provided an application of the previous procedure for generating survival probabilities by applying them to a pension annuity portfolio in which beneficiaries enter the retirement state at the same time. In particular, having assessed the breaking of the homoscedasticity hypothesis in the Lee-Carter model, we intend to quantify its impact on given quantities of interest of the portfolio under consideration. The analysis concerns the dynamic behavior of the financial fund checked year by year arising from the two flows in and out of the portfolio, the first consisting in the increasing effect due to the interest maturing on the accumulated fund and the second in the outflow represented by the benefit payments due in case the pensioners are still alive. Let us fix one of the future valuation dates, say corresponding to time  $k$ , and consider what the portfolio fund is at this valuation date. As concerns the portfolio fund consistency at time  $k$ , we can write:

$$Z_k = Z_{k-1} (1 + ik^*) + N^k P \quad \text{with } k = 1, 2, \dots, n-1 \quad (5)$$

$$Z_k = Z_{k-1} (1 + ik^*) + N^k R \quad \text{with } k = n, n+1, \dots, w-x \quad (6)$$

Where  $N_0$  represents the number of persons of the same age  $x$  at contract issue  $t=0$  reaching the retirement state at the same time  $n$ , that is at the age  $x+n$ , and  $i \cdot k$  is a random financial interest rate in the time period  $(k-1, k)$ . The formulas respectively refer to the accumulation phase and the annuitisation phase.

Problems Identify: First, the process of parameter estimation might experience convergence problems if identifiability is not addressed. Second, even if  $\theta$  and forecast  $\theta$  are parameterization that give identical historical fits, forecast distributions of mortality rates might be different. The second point means that we need to take care when fitting, e.g. a time series model to the period effects to ensure that models allow in a consistent way for the identifiability problem.

### 3. Forecasting Mortality

Referring to the financial scenario, it refers to the interest rate as the rate of return on investments linked to the assets in which insurer invests. In order to compare, there are both considered a deterministic interest rate and a stochastic interest rate framework.

As regards the former, it is assumed that the deposited portfolio funds earn at the financial interest rate fixed at a level of 3%. As regards the latter, it is adopted the Vasicek model. This stochastic interest rate environment seems to be particularly suitable for describing the instantaneous global rate of return on the assets linked to the portfolio under consideration, because of potential negative values. As is well known, this circumstance is not in contrast with the idea of taking into account a short rate reflecting the global investment strategy related to the portfolio.

As concerns the mortality model, in this study it is considered the survival probabilities generated by the above-described simulation procedure and by the classical estimation of the Lee-Carter model (traditional method). In the former methodology considering is the  $kt$  series arising from the experiment. Following the Box-Jenkins procedure, ARIMA (0, 1, 0) model is more feasible for our time series. After obtaining the  $kt$  projected series, it is constructed the project life table and then generalize the probabilities referred to insured aged  $x = 45$ . In Figure 6 it is report the survival probability distribution as a function of different LC estimation methods: the traditional and the simulation methods by D'Amato and Russolillo.

As we can see, the pattern of simulated probabilities lies under the traditional probabilities. Moreover this difference increases as the projection time increases. Thus, referring to the financial and the demographic stochastic environments described above, we evaluate the periodic portfolio funds. As regards the premium calculation hypotheses, there are used two different assumptions (simulated LC, classical LC) and the fixed interest rate at 4%. It is used the same mortality assumptions made in the premium calculation even for the portfolio fund dynamics from the retirement age on, i.e., which means to resort to a sort of homogeneity quality in the demographic

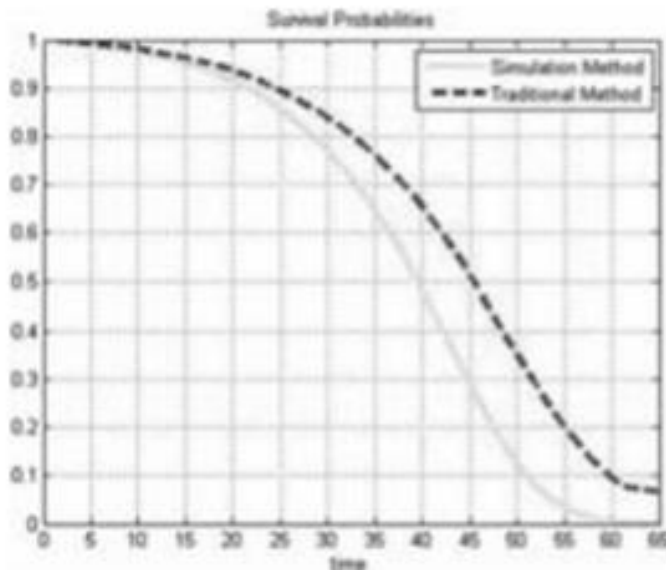


Fig.6 Comparison between the two different methods for generating survival probabilities on the basis of the Lee-Carter model: traditional and simulation method (Source: Authors D'Amato, Russolillo)

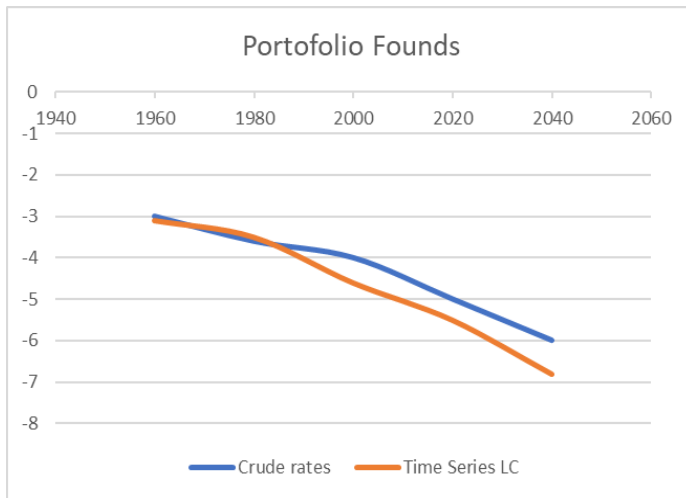


Fig. 7 Portfolio of 1000 pension annuities,  $x=45$ ,  $t=20$ ,  $r=100$ . Fixed rate at 3% (Source: Authors D'Amato, Russolillo)

In the following graphs (see Fig.6 and 7) were present the portfolio funds along with the potential whole contract life, i.e., both into the accumulation phase and into the annuitisation phase. The portfolio funds trend is calculated on a pension annuity portfolio referred to a cohort of  $c = 1000$  beneficiaries aged  $x=45$  at time  $t=0$  and entering in the retirement state 20 years later, that is at age 65.

The cash flows are represented by the constant premiums  $P$ , pay able at the beginning of each year up to  $t=20$  in case the beneficiary is still alive at that moment (accumulation phase) and by the constant benefits  $R=100$  pay able at the beginning of each year after  $t=20$  (annuitisation phase) in case the beneficiary is still alive at that moment. Figure 7 shows how the portfolio funds increase with

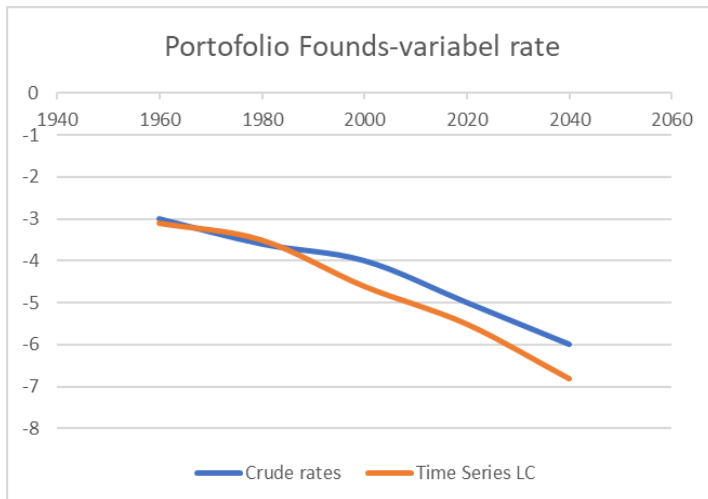


Fig.8 Portfolio of 1000 pension annuities,  $x=45$ ,  $t=20$ ,  $r=100$ . (Source: Authors D'Amato, Russolillo)

Stochastic rate of return better survival probabilities. In particular, in this figure is represented the portfolio funds earning interest, term by term, at the fixed rate of return of 3%, from the time issue on. As a first result it is find out that the portfolio fund amount is overestimated when the survival probabilities are calculated on the basis of the projection of the traditional

LC estimation. On the basis of the results reported above, we can notice how the lack of homoscedasticity affects the portfolio risk assessment. Finally, it is evaluated the portfolio fund consistency from the contract issue on, adopting the Vasicek model for describing the instantaneous global rate of return on the assets linked to the portfolio under consideration. As in the previous case, Figure 8 shows that the traditional forecasting method blows up the portfolio funds amount both into the accumulation and into the annuitisation phases. The findings seen in this paper are confirmed also in the case of the stochastic rate of return. For this reason, it is provided the evidence that the lack of homoscedasticity has a strong effect on the actuarial results.

#### 4. Conclusions

The simulation procedure proposed in this paper is characterized by an experimental strategy to stress the fulfilment of the homoscedasticity hypothesis of the LC model. In particular, it is simulated a different experimental conditions to force the errors to satisfy the model hypothesis in a fitting manner.

Besides, there are developed the kt series for generating more realistic survival probabilities. In this study it is measured the impact of the two different procedures for generating survival probabilities, using the traditional and simulation methods, on a portfolio of pension annuity. The applications, referred to the male population, show that the probabilities generated on the basis of the simulation procedure are lower than the probabilities obtained through the traditional methodology by the LC model. In particular, if we apply the simulated projections to a financial valuation of periodic portfolio funds of pension annuity portfolio, we can observe lower corresponding values than the traditional one, in both the so called accumulation and annuitisation phases. In this paper it is compared the multi-population mortality model and two of its variants with the Common Age Effect (CAE) model by Kleinow (2015) using mortality data from two countries (Italia and Albania).

Especially, we can notice more size able portfolio funds in the event of traditional methodology. In other words, the insurer's financial position would be overestimated by means of the traditional method in comparison with the simulation method. The results of the appraisal arise from the different behaviors of the residuals. In fact, in the traditional methodology, there is heteroscedasticity in the residuals for some age groups which can lead to more optimistic survival projections.

On the other hand, on the basis of the simulation procedure, the final result shows how a more regular residual matrix leads to a flatter kt series according to the LC model hypothesis. This circumstance determines more pessimistic survival projections.

#### References

- [1] Box, G.E.P., Draper, N.R.: *Empirical Model Building and Response Surfaces*. Wiley, New York (1987)
- [2] Coppola, M., D'Amato, V., Di Lorenzo, E., Sibillo, M.: Life office management perspectives by actuarial risk indexes. *Int. Sci. Invest. Man. Finan. Innov.* 2, 73–78 (2008)
- [3] Deaton, A., Paxson, C.: *Mortality, Income, and Income Inequality Over Time in the Britain and the United States*. Technical Report 8534, National Bureau of Economic Research, Cambridge, MA (2004): <http://www.nber.org/papers/w8534>
- [4] Eckart, C., Young, G.: The approximation of one matrix by another of lower rank. *Psychometrical* 1, 211–218 (1936)
- [5] Gabriel, K.R.: The biplot-graphic display of matrices with application to principal component analysis. *Biometrical* 58, 453–467 (1971)
- [6] Human Mortality Database. University of California, Berkeley (USA), and Max Planck Institute for Demographic Research (Germany). Available at [www.mortality.org](http://www.mortality.org) or [www.humanmortality.de](http://www.humanmortality.de) (referred to the period 1950 to 2000)
- [7] Lee, R.D., Carter, L.R.: Modelling and forecasting U.S. mortality. *J. Am. Stat. Assoc.* 87, 659–671 (1992)
- [8] Lee, R.D.: The Lee-Carter method for forecasting mortality, with various extensions and applications. *N. Am. Actuarial J.* 4, 80–91 (2000)
- [9] Olivieri, A., Pitacco, E.: Solvency requirements for pension annuities. *J. Pension Econ. Finan.* 2, 127–157 (2003)
- [10] Renshaw, A., Haberman, S.: Lee-Carter mortality forecasting: a parallel generalised linear modelling approach for England and Wales mortality projections. *Appl. Stat.* 52, 119–137 (2003)
- [11] Russolillo, M., Giordano, G.: A computational experiment to assess sensitivity in bilinear mortality forecasting. *Proceedings of XXXI Convent AMASES*. Lecce, Italy (2007)

- [12] Lee, R.D. & Carter, L. (1992). Modelling and forecasting the time series of U.S. mortality. *Journal of the American Statistical Association*, 87, 659-671.
- [13] Delwarde, A., Denuit, M. & Eilers, P.H.C. (2007). Smoothing the Lee-Carter and Poisson log-bilinear models for mortality forecasting: a penalised likelihood approach. *Statistical Modelling*, 7, 29-48.
- [14] Lee, R.D. & Carter, L. (1992). Modelling and forecasting the time series of U.S. mortality. *Journal of the American Statistical Association*, 87, 659-671.

## Learning from the Patient - The Cooperative Endeavor of Analytic Psychotherapy

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### Abstract

Communication involves intimate human interaction that creates shared realities and forges connections. Nowhere is this more apparent and more necessary than in the therapeutic relationship, where the communication is, essentially, the curative agent. By following the patient's lead, the many nuances of the various levels of communication are harnessed to promote insight and understanding. In this way, that analytic space becomes grounds for new restorative experiences and healing.

**Keywords:** Learning, Patient, Cooperative, Endeavor, Analytic, Psychotherapy

### Introduction

*"Psychotherapy is the systematic use of a human relationship for therapeutic purposes"*

**Hans Strupp, Vanderbilt University Psychologist**

Psychoanalysis and its related therapeutic process can be conceptualized as both a science and an art. As a science, it seeks to forge an understanding of the human mind. As an art, it may be considered the endeavor by which an individual, in close relationship with an analyst, may become acquainted with his/her unconscious feelings and release imprisoned emotions, giving up illusions that were once useful, but have become exaggerated, redundant or outmoded and thus cause pain and dysfunction.

Methods of psychoanalytic therapy, "provide for a situation in which a systematic exploration is undertaken of the patient's automatic, unconscious, defensive solutions to conflict, based on the fact that since childhood he or she has perceived certain wishes, fantasies, emotions and impulses as too dangerous to manage at a conscious level" (Moore & Fine, 1990, p.16). The major aim of such exploration is to help the patient achieve increasingly mature, conscious or preconscious solutions to his or her conflicts.

Often referred to as the "talking cure", psychotherapy relies heavily on the interaction and relationship between therapist and patient, which develops through extensive communications. However, communication in a therapeutic environment, occurs on many levels and is not limited to the direct and explicit verbalizations that ensue in a session. On the contrary, the very nature of analysis determines that the majority of communication which addresses the underlying issues relevant to therapy is not of a direct and obvious nature.

It is the derivative communication, "the indirect communication of thoughts or feelings unconsciously associated to or derived from whatever has primarily provoked them" (Casement, 1992, p. 14), and the subsequent response of the therapist to this communication, that often serves to direct therapy in a forward motion toward the exploration of the patient's unconscious conflicts. It can be argued that in the context of therapy everything that occurs is a communication of some type. Greater attention to the content and process of interactive communication in the therapy session, while suspending premature theory-based interpretations, can facilitate the development of the trusting relationship and the progress toward more effective insight and subsequent change.

### Elements of the Psychoanalytic Process - How One Learns from the Patient

#### Symptom Formation

Sigmund Freud hypothesized that symptoms of psychopathology arise when conflicting emotions produce unmanageable psychic distress. Mirroring scientific notions regarding the conservation of energy, he theorized that psychic conflict creates

an energy imbalance in the psychiatric apparatus that manifests itself in the subjective experience of anxiety, which, in turn, induces the psyche to relieve the distress by transferring awareness of the conflict into the unconscious. This process of psychic repression, however, is typically incomplete and elements of awareness leak into consciousness, again causing anxiety. In response, the psychic apparatus further attempts to relieve the anxiety by transforming it into a neurotic symptom. In essence, Freud posited psychic defenses against intrapsychic conflict and anxiety and considered symptom formation largely as a consequence of the failure of the psychic defense mechanisms (Goldman, 2011).

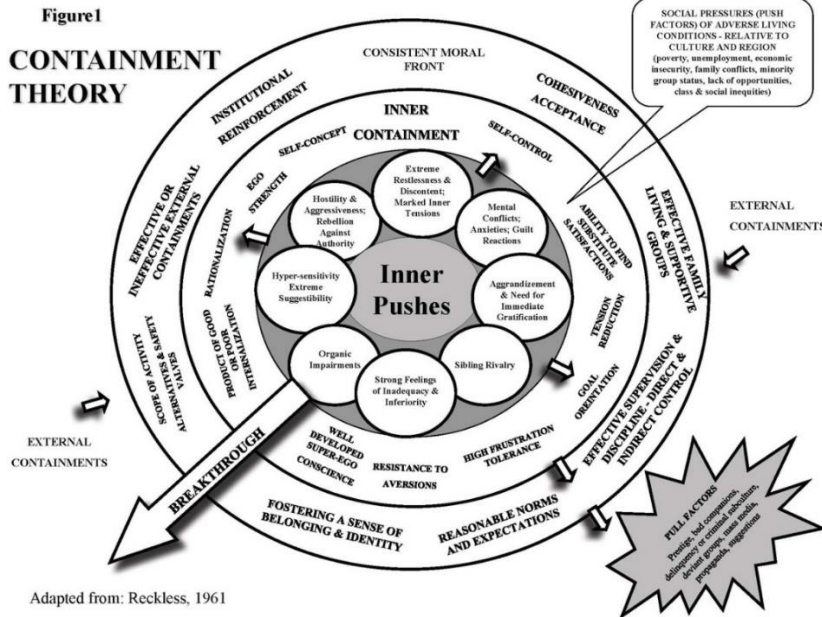
(See Table 1)

Table 1: Psychic Defense Mechanisms Goldman, H. H. (2011). <i>Review of general psychiatry</i> , 10e. New York, NY: McGraw-Hill.	
Denial	The unconscious literally deletes from awareness an unpleasant or anxiety-provoking reality.
Sublimation	The redirection of an unacceptable impulse into an acceptable form of behavior.
Reaction Formation	The redirection of an unacceptable impulse into its opposite.
Displacement	An impulse toward a given person or situation is redirected toward a "safer" less distressing object.
Projection	An unacceptable or anxiety-provoking impulse or affect is transplanted to another individual or situation.
Rationalization	An acceptable explanation for a feeling or behavior is used to camouflage the unacceptable underlying motive or impulse.
Intellectualization	The avoidance of "feeling" by taking refuge in "thinking".
Repression	Disturbing psychological material is secondarily removed from consciousness or primarily prevented from becoming conscious.
Isolation of Affect	The removal of disturbing affect from an idea or event, with the dispassionate details or description remaining.
Suppression	Intentional repression of unpleasant conscious material.
Humor	A conscious and unconscious defense that allows material that stirs unpleasant affects to be better tolerated in consciousness.

Correspondingly, Walter C. Reckless proposed the Containment Theory which posited dysfunctional behavior (or alternatively functional behavior) as the product of interplay between various forms of stressors, known as pushes or pulls, and internal and external controls, known as containments. While originally formulated as a sociological premise, Containment Theory is extrapolated to a representation of intrapsychic functioning and conflict, encompassing the unconscious structure of both adaptive and maladaptive responses.

It assumes that for every individual there exists, in varying levels of strength and functionality, containing external structures as well as protective internal structures. The relative integrity and stability of these entities determines one's predisposition toward either health or dysfunction (Reckless et al., 1956; Reckless, 1961, 1967). Therapy then, would seek to make conscious and fortify these psychic structures.

(See Figure 1)



### Transference and Countertransference

The psychoanalytic orientation to psychotherapy specifically emphasizes the processes of transference and countertransference in the progression of the therapeutic relationship. Transference refers to "the largely unconscious displacement of patterns of feelings, thoughts and behavior, originally experienced in relation to significant figures during childhood, onto the therapist or other significant figure" (Moore & Fine, 1990, p. 196). As therapy progresses transference concentrates more pointedly on the analyst and increases in intensity as it serves to replicate the childhood neurosis. Patients strive to elicit in an analyst a duplication of their basic life struggles, and analysts must interpret that transference while regressively experiencing and containing their own countertransference. In this way the analyst's personal anonymity and neutrality creates a frame within which the transference issues can be worked through and resolved.

According to Freud, (1910; 1963) the concept of transference constitutes a one-person, intrapsychic construct reflecting the patient's psyche. From this perspective, pathology is viewed as a manifestation of the manner and processes in which the individual's instinctual drives are developed and defended against. Subsequently, healing occurs when these drives are made conscious in a therapeutic environment through the development of a transference neurosis whereby a patient experiences regression and the drives are displaced from their original objects onto the analyst. In this context, the analyst represents a neutral "blank screen" and therefore does not contribute to the nature of the transference, but rather merely receives the patient's projections.

The analyst "is presented as a vessel for transference, a potential space within which the patient can live infantile life anew" and furthermore, "... is assumed to approach becoming a perfect observing instrument, transcending his or her idiosyncrasy through submission to the powerful analytic process" (Bollas, 2017, p.200). This strategy is designed to maximize conscious scrutiny of a patient's previously unconscious mental life. Furthermore, this orientation contends that for an analyst to explicitly state his or her own view of reality constitutes a personal disclosure on the part of the analyst that tends to foreclose a patient's exploration of his or her own view.

Conversely, Moreno (1937) espouses an interpersonal alternative to the intrapsychic perspective, stating that, "Transference does not take place toward a generalized person or a vague Gestalt, but toward a role which the therapist represents to the patient. The therapist, in turn, can be caught in experiencing the patient in complimentary roles" (p.8).

Thus, Moreno implies that transference is the product of the engagement of two persons in commendatory roles, which, in terms of the therapeutic context, occurs as the reciprocal influence of therapist and patient represented by the processes of transference and countertransference. From this interactional viewpoint, the therapist is not viewed as a blank screen but rather as an active participant and the therapeutic transference is the product of both the patient's inner world and the therapist's behavior. Moreover, Yalom (2005) asserts that increasing therapist transparency would actually decrease transference because the process evolves not through projection but rather through engagement and complementarity.

From either orientation transference can be characterized as "a form of memory in which repetition in action replaces recollection of events" (Corsini & Wedding, 2013, p. 39). It represents the patient's unconscious communication regarding the inner conflicts and motivations for defenses which constitute the integral issues of therapy. Through analysis and interpretation of the transference neurosis, insights can be gained, repressed memories recalled, issues re-worked in the safe therapeutic environment, and ultimately, substitute sublimated interests developed for effective functioning in the world at large.

Correspondingly, the analyst develops countertransferential reactions to the patient that may encompass a form of negative feelings and/or disproportionately positive, idealizing or even eroticized reactions. Countertransference refers to "the displacement onto the patient of attitudes and feelings derived from earlier situations in the analyst's own life in response to the patient's behavior toward the analyst or a more specific reaction to the patient's transference" (Blum & Goodman, 1999, p.121). Countertransference may exist in relation to a particular individual, to a type of patient, to an aspect of psychopathology, to significant objects and figures in the patient's life, to tangential and adventitious aspects of the patient's current life situation or to his/her history or personality attributes. Additionally, countertransferences are generally a blend of the therapists' own displacements from the past and their reactions to the issues of the patient's transferences. Through this process of interpersonal collaboration therapists often adopt roles in reaction to subtle transference interactional pressures from their patients. Such induced roles indicate to therapists how the patient experiences the therapeutic relationship and provide a glimpse into the kinds of relatedness in the patient's earlier life.

While unanalyzed countertransference reactions are considered negative and even an impediment to effective therapy, conscientious scrutiny of this phenomena can facilitate discernment of the meaning of the patient's feelings, thoughts and behaviors as well as the dynamics of their interpersonal interactions. In many cases, when used appropriately, the process of countertransference makes transference a more efficient and effective agent for change. If, even more than being a blank screen, an analyst can be a detached, safe acknowledgment of the typical way a patient is experienced by others, then this representation can assist in the process of moving the patient beyond the underlying conflict fueling those repetitive reaction patterns. According to Freud, who first noted the existence of this interplay in the therapeutic context, "Countertransference is a major source of the trials and tribulations of the analytic encounter, with the potential for both destructive regression and constructive progress in understanding" (Freud, 1910, p. 151).

This powerful energy flow of transference and countertransference between analyst and patient constitutes the driving force of psychoanalytic work. Commenting on this complex interaction, Bollas (2017) writes, "...for differing reasons and in various ways, analysts re-create their infantile life in the transference in such a determined and unconsciously accomplished way that the analyst is compelled to re-live elements of this infantile history through his countertransference, his internal responses to the analysand" (p.200).

Effective management of the processes of transference and countertransference is essential in understanding the unconscious communication of the patient and ultimately in facilitating progressive insight and change. It is the therapist's role to step back from the subjective experience of these processes as they occur in the therapeutic session and to consider the various cognitive and affective aspects in the context of the patient's life history and problems. In this way, these issues, which characteristically represent recurring patterns of maladaptive and dysfunctional behavior, can be viewed in a new light and used to encourage new, more adaptive and functional responses. Casement (1992, p. ix) refers to this aspect of the therapist's role as the development of internal supervision whereby "analysts monitor the interaction between themselves and their patients, and their impact upon the analytic process."

### **Interpretation and Containment**

Within the context of the evolving therapeutic relationship and the dynamic interplay of transference and countertransference previously described, the analyst offers both progressively insightful explanations and emotional

support as the patient explores unconscious material. Interpretation refers to the central activity of the analyst during treatment whereby, "the analyst expresses an understanding of the patient's mental life, based on the patient's description of memories, fantasies, wishes, fears and other elements of psychic conflict that were formerly unconscious or known to the patient only in incomplete, inaccurate or otherwise distorted form, as well as on the way a patient distorts the relationship with the analyst to meet unconscious needs and to relive old experiences" (Moore & Fine, 1990, p.103). This process of interpretation requires the contribution of both therapist and patient and involves modification as new material emerges. Interpretation allows patients to understand their past and present inner life in a new, less distorted and more complete way, and thus lays the groundwork for the possibility of changes in feelings, attitudes and behavior. In a sense, interpretation represents the overt communication by the analyst based on the cumulative conscious and unconscious communications of the patient and is intended to offer patients explanation and extended knowledge about themselves and the previously unacknowledged aspects of their suppressed unconscious conflicts.

Containment occurs when an individual "projects a part of his or her psyche, especially the uncontrolled emotions, to be held or incorporated by another in a supportive relationship, who absorbs them and translates them into specific meanings, and acts upon them thoughtfully, the whole transaction resulting in a transformation of the projective identifications into meaningful and unthreatening thought" (Moore & Fine, 1990, p.32). Using the vehicle of the transference-countertransference experience patients purposefully communicate their need for the therapist to experience, understand and successfully manage those feelings which the patient has heretofore experienced as unmanageable. Typically, patients bring with them a history of past experiences whereby previous attempts at finding containment in the context of other relationships has failed. In this way, the patients' desperate need to further suppress the emotions has been reinforced and strengthened. Therefore, unconsciously and/or consciously they expect and seek to induce the same reaction from the therapist. Through the process of analytic holding, the therapist's ability to endure these emotions and interpret them in such a way that the patient feels truly understood allows patients to develop their own capacity to manage difficult feelings without resorting to the standard defenses of suppression, repression and avoidance (Casement, 1992, 2013).

In order to move the analysis forward toward useful insight, the therapist must, within the context of the ongoing therapeutic processes of transference and countertransference, provide an adequate balance of interpretation and containment. Interpretation without containment establishes a protective and defensive distance from the emotions a patient is communicating, reinforcing the notion that they are dangerously unmanageable and must remain repressed. Containment alone keeps a patient stuck in a dependency state with the therapist in relation to the quagmire of emotions which the patient experiences as unmanageable and bewildering. Through a balance of interpretation and containment the therapist communicates both a willingness and an ability to comprehend, connect with and tolerate those feelings which the patient experiences as overwhelming.

### **Analytic Space and Analytic Process**

The analytic space, unlike the mental and emotional space in any other interpersonal interaction, exists for the purpose of allowing a unique type of relating, involving transference and subsequent working through the patient's resistance which will bring about significant and lasting change. While there is an exchange of ideas, the space exists for, and is focused on, the needs of the patient and is protected from internal and external influences which distract from the primary purpose. In order to be therapeutic, the analytic space must be free from the intrusive pressures of influence, expectation and judgment which exist in the space of most relationships. The therapeutic space allows the patients to spontaneously be, think, feel and express whatever is reflective of their experience of an autonomous self in that moment. It is from these natural projective expressions that the patient will consciously and unconsciously communicate their issues and lead the therapist toward accurate interpretation of their unresolved conflicts. Within the analytic space the analyst provides a reflective viewpoint and monitors his/her countertransference interactions in order to maintain a level of security that allows the patients to risk examination of heretofore repressed internal conflict and feeling states. It is the maintenance of the analytic space and a willingness to respond to the direction indicated by the unconscious communication of the patient which allows for progress in the analytic process.

As part of the analytic process some individuals may benefit greatly from a period of dependency on or idealization of the therapist (Kohut, 2009; Winnicott, 2014). Ultimately, however, for the patient to grow, this mode of relatedness must be worked through. As Kellerman (1985) states, "Learning to see who the therapist really is is one of the unavoidable steps in acquiring a greater capacity for reality testing and for achieving autonomy. The distortion of reality inherent in idealization

leaves the patient a child, unable to grow up. And sooner or later patients will realize that they were cheated by a leader who did not challenge their flattering idealizations" (pp. 91-92).

### Not-Knowing - the Uncomfortable Realm of the Unknown

Casement asserts that in "any unfamiliar situation elements that can be regarded as familiar are responded to as signs" (1992, p. 9). In this way, therapists as well as patients can sacrifice a true understanding of the uniqueness of a situation for the sake of the comfortable security of moving beyond the not-knowing and into the knowing. For therapists, theory-based expectations of typical behavior or a typical course of therapy can hamper progress by too quickly veering the analyst off course and not leaving room for discovery. Casement further asserts, "If too much weight is given to what is already known, then the unknown remains elusive and our attempts at understanding introduce their own distortions to what is being studied" (p. 190).

### Conclusion

Communication has been referred to as "the process of constructing shared realities through human interaction" (Shockley-Zalabak, 2014, p.23). It can be argued that nowhere is it more imperative to establish a genuine understanding of a shared reality than within the context of a therapeutic relationship where the ideal, as first expressed by Freud, is "to replace the unconscious repression of impulses, wishes and attitudes with rational judgment, to give the patient the opportunity to make conscious decisions about his conflicts, to redirect the psychic energy into higher and more valuable social and cultural activities; in essence, to become the kind of individual he would have become had not the neurosis interrupted his development toward maturity" (Freud, 1963, p.68). From the first expressions of symptomatic behavior patients communicate their unconscious search for help and wholeness. Following their lead, the analyst must "be instrumental in generating a new experience of a different order and disconfirming the patient's pathogenic beliefs" (Ehrenberg, 1984, p.23)

### References

- [1] Blum, H. P. & Goodman, W. H. (1999). Countertransference. In Moore, B. E. & Fine, B. D. (1999). *Psychoanalysis: The major concepts, Rev. Ed.* New Haven, CN: Yale University Press.
- [2] Bollas, C. (2017). *The shadow of the object: Psychoanalysis of the unthought known.* New York, NY: Routledge.
- [3] Casement, P. J. (1992). *Learning from the patient.* New York, NY: The Guilford Press.
- [4] Casement, P. J. (2013). *Further learning from the patient: The analytic space and process, 2e..* New York, NY: Routledge.
- [5] Corsini, R. J. & Wedding, D. (2013). *Current psychotherapies, 10e* Belmont, CA: Brooks/Cole.
- [6] Ehrenberg, D. (1984). Psychoanalytic engagement II: Affective considerations. *Contemporary Psychoanalysis*, 20:560-599.
- [7] Freud, S. (1910). The future prospects of psychoanalytic therapy. *Standard Edition*, 11:139-151.
- [8] Freud, S. (1963). *Works of Sigmund Freud: The neuroses.* New York: Monarch Notes - Simon & Schuster, Inc.
- [9] Goldman, H. H. (2011). *Review of general psychiatry, 6e.* New York, NY: McGraw-Hill.
- [10] Kellerman, P. F. (1985). Charismatic leadership in psychotherapy. *Journal of Group Psychotherapy, Psychodrama & Sociometry* 38, 84-95.
- [12] Kohut, H. (2009). *The analysis of the self: A systematic approach to psychoanalytic treatment.* Chicago, IL: The University of Chicago Press.
- [13] Moore, B. E. & Fine, B. D. (1990). *Psychoanalytic terms & concepts, 3e.* New Haven, CN: The American Psychoanalytic Association.
- [14] Moreno, J. L. (1937). Interpersonal therapy and the psychopathology of interpersonal relations. *Sociometry*, 1, 9-76.
- [15] Reckless, W. C. (1961). A new theory of dysfunction. *Federal Probation*, 25, 42-46.
- [16] Reckless, W. C. (1967). *The crime problem.* New York: Appleton-Century Crofts.
- [17] Reckless, W. C., Dintz, S. & Murry, E. (1956). Self-concept as an insulator against dysfunction. *American Sociological Review*, 21, 744-56.
- [18] Shockley-Zalabak, P. S. (2014). *Fundamentals of communication, 9e.* New York, NY: Pearson.

- [19] Winnicott, D. W. (Ed). (2014). *Collected papers: Through paediatrics to psychoanalysis*. New York, NY: Routledge.
- [20] Yalom, I. D. (2005). *The theory and practice of group psychotherapy*. New York, NY: Basic Books.

## European Recommendations for the Management of Healthcare Workers Occupationally Exposed to Hepatitis

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University Aleksander Moisiu, Durres

### Abstract

Exposure prevention is the primary strategy to reduce the risk of occupational bloodborne pathogen infections in healthcare workers (HCW). HCWs should be made aware of the medicolegal and clinical relevance of reporting an exposure, and have ready access to expert consultants to receive appropriate counselling, treatment and follow-up. Vaccination against hepatitis B virus (HBV), and demonstration of immunisation before employment are strongly recommended. HCWs with postvaccinal anti-HBs levels, 1-2 months after vaccine completion,  $\geq 10$  mIU/mL are considered as responders. Responders are protected against HBV infection: booster doses of vaccine or periodic antibody concentration testing are not recommended. Alternative strategies to overcome non-response should be adopted. Isolated anti-HBc positive HCWs should be tested for anti-HBcIgM and HBV-DNA: if negative, anti-HBs response to vaccination can distinguish between infection (anti-HBs  $\geq 50$  mIU/ml 30 days after 1st vaccination: anamnestic response) and false positive results (anti-HBs  $\geq 10$  mIU/ml 30 days after 3rd vaccination: primary response); true positive subjects have resistance to re-infection, and do not need vaccination. The management of an occupational exposure to HBV differs according to the susceptibility of the exposed HCW and the serostatus of the source. When indicated, post-exposure prophylaxis with HBV vaccine, hepatitis B immunoglobulin or both must be started as soon as possible (within 1-7 days). In the absence of prophylaxis against hepatitis C virus (HCV) infection, follow-up management of HCV exposures depends on whether antiviral treatment during the acute phase is chosen. Test the HCW for HCV-Ab at baseline and after 6 months; up to 12 for HIV-HCV co-infected sources. If treatment is recommended, perform ALT (amino alanine transferase) activity at baseline and monthly for 4 months after exposure, and qualitative HCV-RNA when an increase is detected. Introduction Bloodborne pathogens such as hepatitis B (HBV) and C virus (HCV) represent an important hazard for healthcare workers (HCWs) [1]. In the general population, HCV prevalence varies geographically from about 0.5% in northern countries to 2% in Mediterranean countries, with some 5 million chronic carriers estimated in Europe; while HBV prevalence ranges from 0.3% to 3%. The World Health Organization (WHO) estimates that each year in Europe 304 000 HCWs are exposed to at least one percutaneous injury with a sharp object contaminated with HBV, 149 000 are exposed to HCV and 22 000 to HIV. The probability of acquiring a bloodborne infection following an occupational exposure has been estimated to be on average.

**Keywords:** European, Recommendations, Management, Healthcare, Workers, Occupationally, Exposed, Hepatitis

### Introduction

Bloodborne pathogens such as hepatitis B (HBV) and C virus (HCV) represent an important hazard for healthcare workers (HCWs) [1]. In the general population, HCV prevalence varies geographically from about 0.5% in northern countries to 2% in Mediterranean countries, with some 5 million chronic carriers estimated in Europe; while HBV prevalence ranges from 0.3% to 3%. The World Health Organization (WHO) estimates that each year in Europe 304 000 HCWs are exposed to at least one percutaneous injury with a sharp object contaminated with HBV, 149 000 are exposed to HCV and 22 000 to HIV.

We present here recommendations for the general management of occupational risk of bloodborne infections, HBV vaccination and management of HBV and HCV exposures. A description of the project and recommendations for HIV post-exposure management, including antiretroviral prophylaxis, has been previously published [2], and so issues related to occupational risk and prevention of HIV infection following an occupational exposure will not be discussed further.

## General policies

Exposure prevention is the primary strategy to reduce the risk of occupational bloodborne pathogen infections. All preventive efforts should be made to reduce the risk of occupational exposures. Healthcare organisations should have a system readily available to their personnel that includes educational programmes, written protocols for prompt reporting, evaluation, counselling, treatment, and follow-up of occupational exposures that might place HCWs at risk of acquiring a bloodborne infection.

## Educational programmes and training

All HCWs should be informed, educated and trained about: - The possible risks and prevention of bloodborne infections after an occupational exposure - The measures to prevent bloodborne pathogen exposures . Implementation of standard precautions . Provision of personal protective equipment and safety devices . Implementation of safer procedures. . HBV vaccination - The principles of post-exposure management and the importance of seeking urgent advice following any occupational exposure immediately after it occurs, as certain indicated interventions must be initiated promptly to maximise their effectiveness.

Reporting an occupational exposure Local health policies should specifically identify a designated healthcare provider to whom HCWs can be urgently referred in case of exposure, and who will be responsible for postexposure management, provision of prophylaxis and clinical and serological follow-up. Access to clinicians who can provide post-exposure care should be available during all working hours, including nights and weekends. HCWs should be made aware in advance of the medicolegal and clinical relevance of reporting an occupational exposure, how to report it and to whom it should be reported, and have ready access to expert consultants to receive appropriate counselling, treatment and follow-up. HBV vaccination - HCWs should be vaccinated against HBV, with a standard vaccination schedule [3]. - Before entering nursing and medical schools and before employment in healthcare settings, vaccination or demonstration of immunisation against HBV is strongly recommended [4]. - Pre-vaccination screening is not routinely indicated [5]. - Antibody titre against HBsAg (anti-HBs) should be assessed 1-2 months after completion of a 3-dose vaccination series [6]. - New vaccines or alternative schedules that could determine a higher response rate or a stronger response should be used if available [7-8]. - Combined hepatitis A and hepatitis B vaccine is recommended in case of susceptible HCWs with HCV infection or other liver diseases [9], and could be considered for all HCWs regardless of their clinical status [10].

## Definitions

Primary 3-dose vaccination: three standard doses ((according to manufacturers) of recombinant HBV vaccine administered intramuscularly in the deltoid region, preferably with a 25 mm needle [11], at 0, 1, and 6 months. Responders: subjects with post-vaccinal anti-HBs levels, determined at 1-2 months from the last dose of vaccine, equal to or greater than 10 mIU/mL. Non-responders: subjects with post-vaccinal anti-HBs levels, determined at 1-2 months from the last dose of vaccine, lower than 10 mIU/mL, who tested negative for HBsAg, and anti-HBc [see section 2c].

Post –vaccination management HBV vaccination responders - Responders are protected against HBV infection [12]. - Routine booster doses of HBV vaccine are not recommended for known responders, even if anti-HBs levels become low or undetectable [13]. - Periodic antibody concentration testing after completion of the vaccine series and assessment of the response is not recommended [14].

## HBV vaccination non-responders

5%-10% of the adult population will not respond to standard HBV vaccination. - Risk factors for vaccine non-response include: male sex, older age, cigarette smoking, obesity, immunodeficiency, renal failure, intragluteal vaccine administration, chronic diseases, certain HLA haplotypes and coeliac disease [15-16]. - If non-responders test HBsAg/anti-HBc negative: • Administer a fourth dose and then retest the HCWs for response 1-2 months later [17]; • If no response has been elicited, complete a full course of conventional vaccine at the standard doses (i.e. administer a fifth and sixth dose), and retest the HCW for response 1-2 months after the last dose of vaccine [17-18]. • Possible alternative strategies, that need further evaluation, to overcome nonresponse to standard HBV vaccination are: Vaccines containing S subunit, pre-S1 and pre-S2 particles [19- 20]; Three intradermal 5 ?g doses of standard vaccine, given every two weeks [21]; Combined hepatitis A and hepatitis B vaccines [22]; High-dose standard vaccine series [18, 23-24]

## Management of isolated anti-HBc –

Test isolated anti-HBc positive HCWs for IgM anti-HBc and HBV-DNA [25], possibly with sensitive PCR assays, to determine whether these subjects are low-level HBsAg carriers, or in the window phase, or have occult HBV infection [26-27]. - If negative for anti-HBcIgM and HBV-DNA, initiate vaccination, and test the HCW 30 days after the first dose of vaccine: an anti-HBs titre exceeding or equal to 50 mIU/mL indicates an anamnestic response (isolated anti-HBc indicated infection with HBV) [28-29]. True positive subjects with isolated anti-HBc (those with anamnestic response) have resistance to HBV reinfection and do not need to complete vaccination or to receive HBV post-exposure prophylaxis [30].

Management of occupational exposures Immediate treatment of the exposure site - Percutaneous exposure: encourage bleeding and wash with soap and water - Cutaneous contaminations: wash with soap and water. - Mucous membranes contamination: flush with water. - Eyes should be irrigated with clean water, saline, or sterile irrigants. - Although no evidence exists that using antiseptics/disinfectants reduces the risk of bloodborne pathogen transmission, their use is not contraindicated, as both viruses are enveloped and are supposed to be relatively sensitive to many chemical agents. - The application of caustic agents (i.e. bleach) or the injection of antiseptics or disinfectants onto the wounds is not recommended [1]. Risk assessment - In case of an occupational exposure to an at risk bloodborne infection, baseline HBV, HCV, HIV immune status of the exposed HCW should be available. - For medicolegal reasons, store a plasma and serum sample of the exposed HCW at baseline. - Evaluate the exposure's potential to transmit HBV, HCV, and HIV, based on the type of exposure and body material involved [2].

Evaluate the source patient's serostatus for antibodies against HIV (HIV-Ab), HCV (HCV-Ab) and for HBsAg. If unknown, inform the source patient of the incident and obtain an informed consent. Results should be readily available. Source testing for HBsAg can be avoided when the HCW is known to be protected by vaccine or natural immunity. Direct virus assays (e.g. HBV-DNA or HCV-RNA/HCV Ag) are not recommended. - Store a plasma and a serum sample from the source for further investigations. - Consider as infected sources who refuse testing or cannot be tested. Management of exposures to HBV The management of a possible occupational exposure to HBV differs.

Management of exposures to HBV The management of a possible occupational exposure to HBV differs according to the susceptibility and serostatus of the exposed HCW [TABLES 1,2]. When necessary, postexposure prophylaxis with HBV vaccine, hepatitis B immunoglobulin (HBIG) or both must be started as soon as possible, preferably within 24 hours from the exposure and no later than one week [32-33]. This management is no different in pregnant HCWs [34]. HBsAg-positive HCWs should receive clinical evaluation and their serostatus, as well as risk for hepatitis D, should be assessed. If, notwithstanding optimal post-exposure management, acute B hepatitis develops, the person should be referred for medical management to a specialist knowledgeable in this area.

1. HCV-Ab positive, untested or unidentifiable source - Test the HCW for HCV-Ab (EIA) at baseline and 6 months from exposure; extend to 12 months for exposures to HIV-HCV co-infected sources Confirm positive results with a recombinant immunoblot assay or qualitative HCV-RNA. - Perform ALT activity at baseline, and then monthly for 4 months after exposure. - Perform qualitative HCV-RNA when an increased transaminase level is detected. - Some experts would also test for HCV-Ab at 3 months, as most seroconverters are already positive at this time, and in order to reduce loss to follow-up and the anxiety of the exposed HCW.

2. HCV-Ab negative source - In case of HIV infection, immunosuppression or other conditions (i.e. dialysis) associated with possible false negative results in the source, follow recommendations for exposure to an HCV positive source. Conclusions Accidental blood and body fluid exposures entail the risk of occupational infection by bloodborne pathogens in HCWs, mainly HBV, HCV, and HIV [39-41]. Notwithstanding effective pre- and post-exposure prophylaxis for HBV and the availability of post-exposure prophylaxis against HIV, the best approach to avert cases of occupational bloodborne infection remains to prevent these exposures. However, the adoption of a rational pre- and post-exposure management could help to minimise consequences and costs. In this regard, the recommendations here presented are complementary to the European recommendations for post-exposure prophylaxis of HIV infection in healthcare workers [2], both being developed within a project funded by the European Commission with the aim to standardise the management of occupational exposures to HIV/bloodborne infections in Europe.

These recommendations must be considered dynamic documents. Indeed, scientific evidence appearing in the literature after the consensus meetings was also included in these documents, and recommendations may change in the future with

further further research and scientific information, as some issues remained unresolved or controversial. Among issues related to HBV vaccination, there was no unanimous consensus regarding the post-vaccinal anti-HBs level to be considered as protective.

A minority of the expert panel suggested a more conservative approach, in which those HCWs who have post-vaccinal anti-HBs levels between 10 and 100 mIU/mL are considered as low-responders. These subjects may, due to waning antibodies, develop asymptomatic hepatitis B infection and seroconversion after exposure, although only very rare cases of chronic infection/disease have been reported [42]. For these subjects, the same recommendations used for non-responders could be applied, including HBsAg determination. Indeed, among these subjects, concurrence of hepatitis B surface antibodies and surface antigen is also possible [43]. No data directly assess the efficacy of HBIG in post-exposure prophylaxis in HCWs. The use of hepatitis B vaccine alone after exposure to HBsAg-positive blood seems to achieve comparable results to HB vaccine combined with HBIG [44]; however, the vast majority of the expert panel agrees on HBIG administration.

Nonetheless, in the discussion, several reservations were expressed regarding the administration of HBIG. For exposures to a source of unknown serostatus, while the majority of the expert panel would treat as if HBsAg positive, some experts would consider the option of HBIG administration according to the probability of infection of source patient (e.g. drug user, coming from high endemicity country, etc.). In unvaccinated HCWs testing anti-HBs negative, it was suggested that testing for anti-HBc would avoid HBIG administration if the subject had natural immunity.

Moreover, as a protective response should be elicited in these subjects after the first three doses of vaccine during the accelerated vaccination schedule, the administration of the second dose of HBIG could be avoided; this same reservation was expressed for vaccinated HCWs with an unknown antibody response, in view of the high probability that the subject would respond to a booster dose, and for non-responders to primary vaccination, in view of the high probability that the subject would respond to a second, accelerated vaccination schedule.

Cost-effectiveness issues could also be considered; for example, in young subjects, low-dose intramuscular or intradermal vaccination provides long-term effective protection and can be used as a cost-saving vaccination strategy [45-46]. Finally, for the management of non-responders, nucleic acid vaccines or DNA vaccines are candidate vaccines to prevent and treat viral hepatitis, and hepatitis B DNA vaccine seems to induce protective antibody responses in human non-responders to conventional vaccination [47]. The preliminary results of an ongoing trial are promising in this regard. Regarding the management of HCV exposures, until new anti-HCV drugs such as HCV serine protease inhibitors, which may eventually be used for post-exposure prophylaxis, neutralising antibodies to hepatitis C virus [48], or an anti-HCV vaccine are available [49], the discussion focuses on the opportunity of treating acute infection, an issue thoroughly discussed during the consensus meeting. The resulting dichotomy is mirrored in the follow-up schedule.

Further well-conducted, randomised clinical trials are needed to conclusively support the treatment option. Whether treatment during the acute phase could avoid the establishment of HCV reservoirs and therefore ultimately contribute to decrease the risk of cirrhosis and hepatocellular carcinoma, however, remains to be determined. New data will be necessary to give definitive indications on these and other issues.

In the meantime, it is important to maintain surveillance of occupationally exposed HCWs, and to promote a widespread implementation of preventive strategies such as standard precautions, education on exposure risk, better sharps disposal systems, personal protective equipment, and safety-engineered sharp devices to ensure a safer working environment in theand safety-engineered sharp devices to ensure a safer working environment in the healthcare setting.

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## References

- [1] Alvarado-Ramy F, Alter MJ, Bower W, Henderson DK, Sohn AH, Sinkowitz-Cochran RL, et al. Management of occupational exposures to hepatitis C virus: current practice and controversies. *Infect Control HospEpidemiol.* 2001;22:53-5.
- [2] Are booster immunisations needed for lifelong hepatitis B immunity? European Consensus Group on Hepatitis B Immunity. *Lancet.* 2000 Feb 12;355(9203):561-5.
- [3] Averhoff F, Mahoney F, Coleman P, Schatz G, Hurwitz E, Margolis H. Immunogenicity of hepatitis B Vaccines. Implications for persons at occupational risk of hepatitis B virus infection. *Am J Prev Med.* 1998;15:1-8.
- [4] Bertino JS Jr, Tirrell P, Greenberg RN, Keyserling HL, Poland GA, Gump D, et al. A comparative trial of standard or high-dose S subunit recombinant hepatitis B vaccine versus a vaccine containing S subunit, pre-S1, and pre-S2 particles for revaccination of healthy adult nonresponders. *J Infect Dis.* 1997;175:678-81
- [5] Cardo DM, Culver DH, Ciesielski CA, Srivastava PU, Marcus R, Abiteboul D, et al. A casecontrol study of HIV seroconversion in health care workers after percutaneous exposure. Centers for Disease Control and Prevention Needlestick Surveillance Group. *N Engl J Med.* 1997;337:1485-90.
- [6] Center for Disease Control. Update on adult immunization: recommendations of the Immunization Practices Advisory Committee (ACIP). *MMWR Recomm Rep.* 1991 Nov 15;40(RR-12):1-94.
- [7] Das HS, Sawant P, Shirhatti RG, Vyas K, Vispute S, Dhadphale S, et al. Efficacy of low dose intradermal hepatitis B vaccine: results of a randomized trial among health care workers. *Trop Gastroenterol.* 2002;23:120-1.
- [8] Durlach R, Laugas S, Freuler CB, Rodriguez VE, Costa M. Ten-year persistence of antibody to hepatitis B surface antigen in healthcare workers vaccinated against hepatitis B virus, and response to booster vaccination. *Infect Control HospEpidemiol.* 2003 Oct;24(10):773-6.
- [9] EASL Jury. EASL International Consensus Conference on Hepatitis B. 13-14 September, 2002: Geneva, Switzerland. Consensus statement (short version). *J Hepatol.* 2003;38:533-40.
- [10] Erensoy S, Bilgic A, Arda B, Ozer O. Low-dose intramuscular hepatitis B vaccination in medical students: 4-year follow-up. *Infection.* 2002;30:303-5.
- [11] Gunson RN, Shouval D, Roggendorf M, Zaaier H, Nicholas H, Holzmann H, et al. Hepatitis B virus (HBV) and hepatitis C virus (HCV) infections in health care workers (HCWs): guidelines for prevention of transmission of HBV and HCV from HCW to patients. *J Clin Virol.* 2003;27:213-30.
- [12] Hinrichsen H, Benhamou Y, Wedemeyer H, Reiser M, Sentjens RE, Calleja JL, et al. Shortterm antiviral efficacy of BILN 2061, a hepatitis C virus serine protease inhibitor, in hepatitis C genotype 1 patients. *Gastroenterology.* 2004;127:1347-55.
- [13] Hoofnagle JH. Therapy for acute hepatitis C. *N Engl J Med.* 2001;345:1495-1497.
- [14] Immunization of health care workers: recommendations of the Advisory Committee on Immunization Practices (ACIP) and the Hospital Infection Control Practices Advisory Committee (HICPAC). *MMWR MMWRRecomm Rep.* 1997 Dec 26;46(RR-18):1-42..
- [15] Immunization of health care workers: recommendations of the Advisory Committee on Immunization Practices (ACIP) and the Hospital Infection Control Practices Advisory Committee (HICPAC). *MMWR Recomm Rep.* 1997 Dec 26;46(RR-18):1-42
- [16] Ippolito G, Puro V, Petrosillo N, De Carli G. Surveillance of occupational exposure to bloodborne pathogens in health care workers: the Italian national programme. *Euro Surveil.* 1999;4:33-36.
- [17] Jacobs RJ, Gibson GA, Meyerhoff AS. Cost-effectiveness of hepatitis A-B vaccine versus hepatitis B vaccine for healthcare workers and public safety workers in the western United States. *Infect Control HospEpidemiol.* 2004 Jul;25(7):563-9.
- [18] Jaeckel E, Cornberg M, Wedemeyer H, et al. Treatment of acute hepatitis C with interferon alfa-2b. *N Engl J Med.* 2001;345:1452-7.
- [19] Kim MJ, Nafziger AN, Harro CD, Keyserling HL, Ramsey KM, Drusano GL, et al. Revaccination of healthy nonresponders with hepatitis B vaccine and prediction of seroprotection response. *Vaccine.* 2003;21:1174-9.
- [20] Koff RS. Risks associated with hepatitis A and hepatitis B in patients with hepatitis C. *J ClinGastroenterol* 2001;33:20-6.
- [21] Kubba AK, Taylor P, Graneek B, Strobel S. Non-responders to hepatitis B vaccination: a review. *Commun Dis Public Health.* 2003 Jun;6(2):106-12..

- [22] Larghi A, Zuin M, Crosignani A, Ribero ML, Pipia C, Battezzati PM, et al. Outcome of an outbreak of acute hepatitis C among healthy volunteers participating in pharmacokinetics studies. *Hepatology*. 2002;36:993-1000.
- [23] Layford EG, Hogan PG, Bansal AS, Harrison K, Drummond D, Looke DF, et al. Intradermal recombinant hepatitis B vaccine for healthcare workers who fail to respond to intramuscular vaccine. *Infect Control Hosp Epidemiol*. 2002;23:87-90.
- [24] McMahon BJ, Bruden DL, Petersen KM, Bulkow LR, Parkinson AJ, Nainan O, et al. Antibody levels and protection after hepatitis B vaccination: results of a 15-year follow up. *Ann Intern Med*. 2005;142:333-341.
- [25] McMahon BJ, Parkinson AJ, Helminiak C, Wainwright RB, Bulkow L, Kellerman-Douglas A, et al. Response to hepatitis B vaccine of persons positive for antibody to hepatitis B core antigen. *Gastroenterology*. 1992;103:590-4.
- [26] Mirza A, Wyatt M, Begue RE. Infection control practices and the pregnant health care worker. *Pediatr Infect Dis J*. 1999;18:18-22.
- [27] Noborg U, Gusdal A, Horal P, Lindh M. Levels of viraemia in subjects with serological markers of past or chronic hepatitis B virus infection. *Scand J Infect Dis*. 2000;32:249-52.
- [28] Noh KW, Poland GA, Murray JA. Hepatitis B vaccine nonresponse and celiac disease. *Am J Gastroenterol*. 2003 Oct;98(10):2289-92.
- [29] Nothdurft HD, Zuckerman J, Stoffel M, Dieussaert I, Van Damme P. Accelerated vaccination schedules provide protection against hepatitis A and B in last-minute travelers. *Travel Med*. 2004;11:260-1.
- [30] Palmovic D, Crnjakovic-Palmovic J. Prevention of hepatitis B virus (HBV) infection in health-care workers after accidental exposure: a comparison of two prophylactic schedules. *Infection*. 1993;21:42-5.
- [31] Poland GA, Borrud A, Jacobson RM, McDermott K, Wollan PC, Brakke D, et al. Determination of deltoid fat pad thickness. Implications for needle length in adult immunization. *JAMA*. 1997 Jun 4;277(21):1709-11.
- [32] Poland GA, Jacobson RM. Clinical practice: prevention of hepatitis B with the hepatitis B vaccine. *N Engl J Med*. 2004;351:2832-8.
- [33] Poland GA. Hepatitis B immunization in health care workers : dealing with vaccine nonresponse. *Am J Prev Med*. 1998;15:73-7.
- [34] Prüss-Ustün A, Rapiti E, Hutin Y. Sharps injuries: global burden of disease from sharps injuries to health-care workers. Geneva, World Health Organization. 2003 (WHO Environmental Burden of Disease Series, No 3). Available at: [http://www.who.int/quantifying\\_ehimpacts/publications/en/sharps.pdf](http://www.who.int/quantifying_ehimpacts/publications/en/sharps.pdf) [Accessed April 27, 2005]
- [35] Puro V, Cicalini S, De Carli G, Soldani F, Ippolito G. Towards a standard HIV post exposure prophylaxis for healthcare workers in Europe. *Euro Surveill*. 2004;9:40-43.
- [36] Quaglio G, Lugoboni F, Vento S, Lechi A, Accordini A, Bossi C, et al. Isolated presence of antibody to hepatitis B core antigen in injection drug users: do they need to be vaccinated? *Clin Infect Dis*. 2001;32:E143-E144.
- [37] Raimondo G. Occult hepatitis B virus infection and liver disease: fact or fiction? *J Hepatol*. 2001;34:471-3.
- [38] Raz R, Koren R, Bass D. Safety and immunogenicity of a new mammalian cell-derived recombinant hepatitis B vaccine containing Pre-S1 and Pre-S2 antigens in adults. *Isr Med Assoc J*. 2001 May;3(5):328-32.
- [39] Rottinghaus ST, Poland GA, Jacobson RM, Barr LJ, Roy MJ. Hepatitis B DNA vaccine induces protective antibody responses in human non-responders to conventional vaccination. *Vaccine*. 2003;21:4604-8.
- [40] Silva AE, McMahon BJ, Parkinson AJ, Sjogren MH, Hoofnagle JH, Di Bisceglie AM. Hepatitis B virus DNA in persons with isolated antibody to hepatitis B core antigen who subsequently received hepatitis B vaccine. *Clin Infect Dis*. 1998;26:895-7.
- [41] Struve J, Aronsson B, Frenning B, Forsgren M, Weiland O. Seroconversion after additional vaccine doses to non-responders to three doses of intradermally or intramuscularly administered recombinant hepatitis B vaccine. *Scand J Infect Dis*. 1994;26(4):468-70.
- [42] Ural O, Findik D. The response of isolated anti-HBc positive subjects to recombinant hepatitis B vaccine. *J Infect*. 2001;43:187-90.
- [43] Weinbaum C, Lyster R, Margolis HS; Centers for Disease Control and Prevention. Prevention and control of infections with hepatitis viruses in correctional settings. Centers for Disease Control and Prevention. *MMWR Recomm Rep*. 2003;52(RR-1):1-36.
- [44] Yazdanpanah Y, De Carli G, Miguères B, Lot F, Campins M, Kammerlander R, et al. Risk factors for hepatitis C virus (HCV) seroconversion in health care workers (HCWs). 43rd ICAAC, Chicago, US, September 14-17, 2003: Abstract V-772.

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- [45] Yu MY, Bartosch B, Zhang P, Guo ZP, Renzi PM, Shen LM, et al. Neutralizing antibodies to hepatitis C virus (HCV) in immune globulins derived from anti-HCV-positive plasma. *Proc Natl Acad Sci U S A*. 2004;101:7705-10.
  - [46] Zaaijer HL, Lelie PN, Vandenbroucke-Grauls CM, Koot M. Concurrence of hepatitis B surface antibodies and surface antigen: implications for postvaccination control of health care workers. *J Viral Hepat*. 2002;9:146-8.
  - [47] Zuckerman JN, Sabin C, Craig FM, Williams A, Zuckerman AJ. Immune response to a new hepatitis B vaccine in healthcare workers who had not responded to standard vaccine: randomised double blind dose-response study. *BMJ*. 1997;314:329-33
  - [48] Zuckerman JN, Zuckerman AJ. Recombinant hepatitis B triple antigen vaccine: Hepacare. *Expert Rev Vaccines*. 2002 Aug;1(2):141-4.
  - [49] Zuckerman JN. Hepatitis B third-generation vaccines: improved response and conventional vaccine non-response--third generation pre-S/S vaccines overcome non-response. *J Viral Hepat*. 1998;5Suppl 2:13-5.

## Subjects and Subjectivities on-Line. Thought Processes

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### Abstract

The characterization of the symbolic cyber-cultural exchanges in the world of the cyber-society as a socio-semiotic practice is determinant in the configuration of subjects and subjectivities, which show the new forms of social relations, and interactions in the actual global society, starting from the languages of cyber-culture. It is clear that contemporary societies have experienced deep transformations in a relatively short span, in comparing it with other epochs of humanity, as an outcome of the globalization process. One of them is the incessant flow techno-mediated of the information and communication than permeates and modify all the areas and social, cultural and educational practices. The cyberspace confronts the objective, universal, and true modern world with a border world, without spaces or time, from where a new presence arises projected from the virtual world; here languages come to life in the stage of a new expressive medium, body and subjectivity are the protagonists. There is a lot to say about the cyber-culture, not only about the technological impact, but also about the modes of subjectivity created, starting from the multi-presence of bodies on line generated in this symbolic space.

**Keywords:** cyber-culture, episteme, subject, subjectivities

### Introduction

(Abstract and text in Spanish)

#### **SUJETOS Y SUBJETIVIDADES ON-LINE- PROCESOS DE PENSAMIENTO<sup>1</sup>**

##### **Presentación**

*Caracterizar los intercambios simbólicos ciberculturales en el mundo de la cibersociedad como práctica sociosemiótica, es determinante en la configuración de sujetos y subjetividades, que dan cuenta de las nuevas formas de relaciones e interacciones sociales en la sociedad global actual a partir de los lenguajes de la cibercultura, como espacio de construcción epistémica. Es claro que las sociedades contemporáneas en la múltiple expresión de la episteme, han experimentado profundas transformaciones en un lapso relativamente breve, si se compara con otras épocas de la humanidad como resultado del proceso de globalización. Uno de ellos, es el incesante flujo tecnomediado de la información y la comunicación que permea y modifica todos los ámbitos y prácticas sociales, culturales y educativas. El ciberespacio confronta el mundo moderno objetivo, universal y verdadero con un mundo fronterizo, sin espacios ni tiempo, de donde surge una nueva presencia proyectada desde la virtualidad; aquí los lenguajes toman vida en el escenario de un nuevo medio expresivo, cuerpo y subjetividad son los protagonistas. Hay mucho que decir sobre la cibercultura, no solo sobre el impacto tecnológico, sino también sobre los modos de subjetividades creados a partir de la multipresencia de cuerpos on-line generada en este espacio simbólico.*

**Palabras Claves:** Cibercultura. Episteme. Sujeto y Subjetividades.

### **PRÄSENTATION**

Zur Konfiguration vom Subjekt und Subjektivitäten, die neuen Formen der Beziehungen und sozialen Interaktionen in der gegenwärtigen globalen Gesellschaft von den Sprachen der Cyberkulturen und seine epistemische Konfiguration berichten, es ist entscheidend die Charakterisierung der cyber-kulturellen symbolischen Austausche in der Welt der Cybersociety als soziale Semiotik.

<sup>1</sup> La presente ponencia hace parte de la tesis doctoral de la autora, titulada: "Configuración Sociosemiótica del chat: una visión multimodal" repositorio.uptc.edu.co/bitstream/001/1549/2/TGT-290.pdf

Als Ergebnis des Globalisierungsprozesses haben die zeitgenössischen Gesellschaften in relativ kurzer Zeit, im Vergleich mit anderen Epochen der Menschheit, tiefgreifende Veränderungen erfahren. Der unaufhörliche Fluss von Technologie und Kommunikation, der alle sozialen, kulturellen und pädagogischen Bereiche und Praktiken durchdringt und modifiziert, ist einer dieser Änderungen

Die objektive, universelle und wahre moderne Welt wird\* mit einer Grenzwelt, ohne Räume oder Zeit für den Cyberspace, konfrontiert. Von hier aus entsteht eine neue Präsenz, die aus der Virtualität projiziert wird. Die Sprachen erwecken zum Leben hier auf die Bühne eines neuen Ausdrucksmediums, was zum Körper und zur Subjektivität entspricht. Es gibt viele Aspekte, die in Bezug auf die Cyberkultur berücksichtigt werden müssen, und zwar nicht nur in Bezug auf die technologischen Auswirkungen, sondern auch auf die Arten der Subjektivität, die durch die Mehrfachpräsenz von Online-Körpern entstehen, die in diesem symbolischen Raum erzeugt werden.

Cyberkultur, Episteme, Subjekt und Subjektivitäten

### UNA APROXIMACIÓN A LA EPISTEME EN LA CIBERSOCIEDAD

El conocimiento se expresa a través del lenguaje, el lenguaje mismo es ya una forma del conocimiento, la forma como está estructurado esboza la estructura profunda de la episteme, esto refiere el sentido histórico que propone Foucault cuando señala el espacio social, cultural y político desde donde se construye el saber<sup>1</sup>. Lo que se evidencia con Foucault es que la episteme no es una constante en el tiempo, su variabilidad depende de los poderes articulados a cada época del hombre y a lo que se privilegia como conocimiento en cada tramo de la historia.

En el contrapunto de este enfoque se ubica de manera expositiva el poder tecnológico y la comunicación como espacio de construcción de sentido; más allá de un carácter meramente informativo, la comunicación en la sociedad contemporánea fundamenta la base de lo que se ha llamado recientemente *sociedad del conocimiento y de la información*. Esta realidad señala un momento crucial en la transformación misma del conocimiento y en el enfoque de los estudios epistemológicos.

Ya no hay una historia lineal de la epistemología, como tampoco existe un solo sentido de la episteme. Hay giros y saltos que contradicen el sentido homogéneo con el que Occidente ha tratado de construir su sentido de civilización. La comunicación siempre ha estado cargada de símbolos, pero cada época tiene también su ruptura del símbolo, sus contraflujos de sentido y sus contradicciones internas. El carácter social del lenguaje al trascender la comunicación nos habla de la construcción colectiva del conocimiento: no hay idiomas hablados por una sola persona, ni experiencias vividas por una sola cultura, el sentido continuo ha encontrado abismos en su trayectoria.

Con esta premisa se aborda inicialmente y antes de incursionar en un sentido epistemológico, la función del signo. En el signo encontramos originariamente la comunicación acompañada de la técnica; la voz es también una técnica de comunicación como lo son la escritura y la música.

"Dentro de la sociedad actual el estudio de este sistema de comunicación humana es un hecho relevante, producto de una cadena de importancia en los ámbitos verbal y no verbal, representados por signos (lingüísticos, icónicos, fonéticos, gustativos, expresivos, estéticos, audio-visuales, entre otros) que funcionan como una totalidad expresiva, lo que configura un sistema sociocultural con otras dinámicas de comunicación". (Ortiz, 2016, p. 30)

En esta búsqueda de las formas y las estructuras hay quienes se han remontado a través de la lingüística a los orígenes mismos del signo y han encontrado la biología como el primer escenario de presentación del signo. Incluso se ha acudido al comportamiento de los animales y las plantas, el comportamiento de las abejas y su comunicación a través de olores, aleteos, danzas, feromonas, venenos y movimientos geométricos se han convertido en lugar común para ejemplificar el uso del signo en los animales.

La búsqueda del sentido primero, del lenguaje secreto de las plantas y los pájaros, ha sido la base de donde arranca una buena parte de la indagación por el conocimiento. Algunos tratados sobre feromonas nos acercan a la comunicación desde el signo biológico. Las feromonas son sustancias de la bioquímica de los animales y las plantas que cumplen funciones comunicativas a través del olor y son parte de sus sistemas de defensa, de reproducción y de sobrevivencia, las feromonas

<sup>1</sup> Foucault Michel, Las palabras y las cosas, SXXI Editores, Argentina 1968. 378 págs.

son medios de comunicación de los estados sexuales, de guerra, o de vida del mundo vegetal, de allí que algunos encuentren en la naturaleza los primeros signos cargados de sentido comunicativo.


En uno de los innumerables estudios sobre el tema José Hierro S. Pescador (1980) en su ejercicio de filosofía del lenguaje<sup>1</sup> nos trae las mismas referencias desde el mundo natural para señalarnos, en sentido contrario, el decrecimiento y la atrofia de la actividad hormonal en la especie humana. Esta singularidad de la especie humana en el contexto de las especies en la naturaleza es para Hierro una muestra de la función comunicativa del lenguaje humano, como el primer paso de la separación del hombre del entorno natural, el lenguaje es la experiencia de la expulsión del paraíso y el comienzo del conocimiento propiamente humano a través del lenguaje. Hierro argumenta que ante la presencia de “medios de comunicación más eficaces”<sup>2</sup> las feromonas como recursos biológicos de comunicación son remplazadas por recursos técnicos de mayor incidencia social y mayor eficacia comunicativa en un mundo global.

Lo que Hierro toma a manera de ejemplo como una parte episódica de su ensayo, se puede asumir como un enfoque que nos sirve para apreciar los primeros cambios importantes que determinan la producción del lenguaje como elemento constitutivo de la separación del hombre y la naturaleza, aunque algunos autores no estarían de acuerdo en reconocer el signo como parte componente de la comunicación en la naturaleza. Lo que se quiere resaltar con esta referencia es la importancia que tiene la técnica en la construcción del lenguaje y en la conformación misma del sentido de la sociedad; la técnica determina en buena parte el horizonte de la civilización humana. “Desde la propuesta de Barthes (1971) de relacionar el signo con el mundo, los signos y los usuarios, es importante destacar la consideración teórica de la expansión del signo como la proyección de sus significados” (Ortiz, 2016, P. 32) y sentidos en la sociedad, donde adquiere otras configuraciones que el ser social produce a partir del conocimiento de sus realidades y la expresión de sus múltiples sentidos. Me refiero aquí a los modos comunicativos, pero se puede extender el argumento a las formas del conocimiento que están más allá de lo que se conoce como la *tekné* griega. El conocimiento empieza como técnica, aunque se halla interpuesto un límite entre ciencia y técnica, la primera no es posible sin la segunda, y menos si enfatizamos este punto en el contexto de la vida contemporánea.

Desde el enfoque presentado podemos apreciar cambios importantes en la sociedad actual. El hombre es siempre un ser biológico pero en la medida que la técnica avanza, se expande, o interviene en la cotidianidad, más se aleja el hombre de su primer entorno que es el mundo natural. Esta condición nos habla del proceso de mecanización de la vida, la máquina se convierte en nuestros días en receptora y emisora de signos y de lenguaje, la cultura entra cada vez con mayor fuerza en procesos que abordan el maquinismo como entorno de la cultura.

Así, el vínculo de proyección de significado y sentido, es la categoría de signo. La sociedad de la comunicación alcanza el valor del conocimiento de los objetos del mundo a partir del reconocimiento e interpretación de los signos. Esto es a lo que Verón (1993) denominó “clausura semiótica” aspecto que configura la concepción de “un sujeto atrapado en una red de signos como condición necesaria para vincularse con las cosas, con el mundo y con la sociedad en general” (Ortiz, 2016, p. 32.)

De acuerdo con lo dicho “el signo se concibe a partir de las diferentes formas semióticas —señales, símbolos, indicios, iconos, signos— en términos de una unidad que en una dinámica mediática conduce a la construcción de sentidos, lo que implica desde la perspectiva de la transducción<sup>3</sup> todo un proceso en que los signos no representan, sino transforman, el sujeto no enuncia construye en la acción” (Ortiz, 2016, p. 60). Lo que permite reconocer, deconstruir y transducir la acción semiótica del lenguaje, aquí la posibilidad transductora garantiza el proceso de comunicación al convertir unas señales en otras, pues los signos, algunas veces denotan, otras connotan.

Un signo <sup>4</sup> a su vez puede ser un símbolo de estatus o una señal de interconexión en red. “Lo cierto es que las señales están relacionadas de manera estrecha con la acción humana, son indicadores de acción y, por supuesto, permean la conducta humana” (Cárdenas, 2015, p.13), lo que implica que el estudio del signo no este restringido exclusivamente al

<sup>1</sup>Hierro S. Pescador José. Principios de la filosofía del lenguaje. Alianza Editorial. Madrid 1980. 190 págs.

<sup>2</sup> Ibid

<sup>3</sup> La transducción es una individuación en progreso que convierte un tipo de señal en otra distinta en lo tecnológico, económico, social, biológico, etc., cuyas transferencias transforman al sujeto en el mundo físico, psíquico, colectivo y artificial, en una relación interobjetiva e intersubjetiva, sincrónica y compleja en relación con el yo, el mundo y el otro.

<sup>4</sup> <https://www.google.com.co/> Apple logo

objeto de estudio de la semiótica (el signo como representación), sino que es visto como un proceso transductivo de interpretación, de sentido y de valor. (Ortiz, 2016, tesis doctoral).

Siempre ha existido la tensión entre naturaleza y cultura, pero frente al vertiginoso desarrollo tecnológico y de las comunicaciones, la tensión biológica sede espacios importantes a la tensión técnica; cada vez más se hace evidente la atrofia del cuerpo frente al desmesurado campo de la técnica pareciera que el hombre decreciera mientras la técnica se hace monumental.

En este nuevo paso de la cultura hay un trazo hondo donde se proyecta la continuidad de la separación entre naturaleza y cultura, con todas las implicaciones y problemáticas a las que este modelo somete a la episteme en medio de la reacción cada vez más violenta de la naturaleza. Pareciera que el avance técnico tuviera como respuesta la guerra de los elementos. Las "piedras", "agua", "fuego", "tierra" y "aire" hablan con retadora contundencia: en el Popol Vuh *las piedras hablan y le dicen a los hombres de madera que van a probar de nuevo la fuerza de los elementos; como el hombre de maíz no ha sido creado todavía, el hombre imperfecto que es el hombre de madera, recibe la aniquilación necesaria por parte de los elementos*.<sup>1</sup>

Esta separación originaria entre naturaleza y cultura, no se resuelve mientras el hombre mantenga su relación estrecha con el mundo natural y la técnica no le garantice su libertad absoluta. No se sabe si esta plena liberación sea algún día posible, pero lo que resulta de la condición actual es una especie de limbo y de paradoja entre expansión técnica y reducción biológica, el ser humano que la historia conoció durante muchos siglos empieza a ser sustituido por el hombre de la "sociedad de la información" y "del conocimiento", esta nueva condición tiene unas severas implicaciones en la forma de abordar los problemas, en el conocimiento mismo y en la construcción de sentido que permea a la sociedad, a la cultura, a la educación y por ende a los sujetos.

Veamos: En un periodo muy corto, en unos cuantos años, del ejercicio del lenguaje a través del texto se pasó al ejercicio multimedial y multimodal<sup>2</sup>, donde, en el paso del hipertexto a la hipermedia hay un proceso de cambio que tiene incidencia tanto en la manera de comunicar y de intercambiar como en las formas de creación, de configuración de sujetos y subjetividades y de pensamiento, lo que conlleva a referirse a los lenguajes emergentes. Las principales características de estos nuevos lenguajes o lenguajes nacientes son la multiplicidad y la pérdida del sentido lineal, exclusivamente referencial.

Así, las nuevas maneras de simbolizar y expresar los hechos y fenómenos del mundo actual, el constante empleo de signos multimodales, de imágenes y demás recursos visuales y auditivos, se separan de las formas lingüísticas establecidas o normalizadas socialmente, lo que confiere un peso determinante al hecho semiótico en los entornos comunicativos virtuales de interacción social y cultural. (Ortiz, 2016, p. 36)

Y aunque existe una tendencia a la homogenización y la estandarización del conocimiento como fenómeno del mercado, la hipermedia, por su carácter interactivo de doble vía, permite la construcción colectiva de lenguaje en todos sus ámbitos, desde el lenguaje cotidiano, hasta el lenguaje de la creación y de la política, en corto, la hipermedia abre el espectro de la significación al sentido y este ya es un hecho histórico tanto en el lenguaje como en las formas de conocimiento.

### Giros Semióticos

Retomando algunos aspectos del signo vemos que algunos investigadores han clasificado los signos en signos icónicos y simbólicos, como es el caso de Peirce<sup>3</sup> quien además agrega el índice que es el signo modificado por el objeto, según afirma Von der Valde (1990) en el estudio de Peirce. Hierro (1980), quien también es un investigador de la obra de Peirce, enfatiza en la diferenciación entre signo y símbolo, o mejor, entre el signo simbólico y los demás signos: "Los símbolos, afirma José Hierro se distinguen claramente de los demás signos por cuanto solamente adquieren su carácter de signos

<sup>1</sup> Popol Vuh. Anónimo. Editorial Losada Buenos Aires, 1965. Pág. 9

<sup>2</sup> Confluencia de presencialidad, integralidad y virtualidad de lenguajes que integran en una misma plataforma los formatos: texto, audio, video, gráficos, fotografías, animaciones, hipertexto etc., de realidad virtual, diferente de cualquier medio analógico y, que debe ser contemplado desde múltiples opciones comunicativas.

<sup>3</sup> Von der Valde Lilian. Aproximación a la semiótica de Charles Peirce. Revista Acciones Textuales, revista de teoría y análisis N 2. Universidad Autónoma Metropolitana. Ciudad de México. 1990

en el proceso de la comunicación, y por lo tanto son signos en cuanto hay reglas que rigen su uso como tales". Hierro escribe esta aclaración para explicar otra afirmación que señala a los símbolos como "signos por convención". De esta clasificación se puede decir que el símbolo es lo propio de la cultura mientras los signos pueden estar en la naturaleza sin ser elementos de la comunicación, es decir, sin ser signos "por convención."<sup>1</sup>

Se toman estos referentes de la reflexión para sustentar que la deriva del símbolo son la abstracción y la cultura que tiene sus pilares en el lenguaje, considerando el lenguaje como sistema simbólico; de allí que Heidegger afirme que el lenguaje es la casa del ser. Esa escisión entre signo y símbolo es el límite donde empieza la historia como construcción colectiva y como obra de creación. En este recorrido aparece simultáneamente la *tekné* como habilidad manual en un principio, luego como una habilidad más compleja que determina buena parte de la tecnología moderna. Tradicionalmente se piensa que mientras la tecnología transforma la realidad, la ciencia se ocupa del sentido, pero en los filones de la tecnología se encuentra simultáneamente el lenguaje, lo que contradice el pensamiento tradicional que escinde ciencia y tecnología; más profundas, las vetas de la ciencia moderna conforman lo que después constituye la base del estudio de una especie de "arqueología del saber", y es lo que indaga Michel Foucault (1968) en su libro *Las palabras y las cosas*.

Ante las nuevas realidades tecnológicas se vive una especie de afasia, un extrañamiento del mundo y del lenguaje, en donde el hombre ya no puede nombrar la realidad con palabras reconocidas, y el contexto se torna más complejo cuando apenas reconocemos las nuevas realidades tecnológicas en el espacio de la comunicación. Aquí ya no está el campo delimitado como territorio exclusivo del lenguaje verbal en donde la comunicación se establece a través de los sonidos en el contexto de la diada tradicional de emisor y receptor, aquí aparecen complejos procesos que requieren de simultaneidad y multiplicidad; entra en juego la semiótica como giro<sup>2</sup>, como acción, donde es clara la posición y definición del sujeto nómada, no como simple receptor sino como quien posibilita y decide su autonomía y singularidad, para con ello dar cabida a la creación de múltiples identidades, sentidos y significados que a su vez "lo constituyen como sujeto diverso, en un entramado de relaciones transductivas (subjettivas), que reinterpretan y reinventan los universos multimodales de la cibernética" (Ortiz, 2016, p. 61).

Foucault lo plantea desde la epistemología a través de una reflexión sobre el orden de las cosas y sobre el espacio en que la cultura occidental ha constituido ese orden en lo que él mismo llama "arqueología" de las ciencias humanas.

A partir de ello el lenguaje se concibe como un problema de intercambio lingüístico y no solo de enunciación; por el contrario, el ser social es un ser de acción, de deseos de pasiones, quien se moviliza en un "espacio sincrónico, veloz y simultáneo", sin fronteras como lo plantea Bauman (2007) lo que favorece los múltiples sentidos y significados al "transmitir, transportar, intervenir y modificar el signo, el símbolo y el cuerpo a partir de las subjetividades" (Ortiz, 2016, p. 56) que se configuran en la virtualidad y que permiten la liberación del hombre, del espíritu y de la sociedad en la cual los internautas, construyen su proceso de transducción en el otorgamiento de otras formas de simbólicas de percepción del mundo, lo que influye en el proceso tradicional de lectura y de escritura, de interpretación, transformación y reconocimiento del "yo, del mundo y del otro" Aspecto que Simondon constituye como "un transporte donde lo transportado resulta transformado" (Simondon, 2008, p. 13). Por lo tanto, el objeto del discurso siempre es una focalización y un producto de la semiosis social (Verón, 1993).

Por ello, los lenguajes y las corporeidades, en una transformación de la episteme, nacen de la red de relaciones generadas en los ciberlenguajes: el aquí, el ahora, el afuera, el cerca, el lejos, se presenta como una ruptura dada desde el espacio que ha sido modificado por las formas multimodales y multimediales de comunicación, donde, como afirma Bauman (2010), "las distancias ya no importan y la idea del límite geofísico es cada vez más difícil de sustentar en el mundo real" (p. 20), lo que implica la velocidad que facilita el desplazamiento del cuerpo desde lo corpóreo a un espacio virtualizado donde confluyen los no lugares (Augé, 2000).

De lo anterior podríamos derivar que no hay una sola episteme, pero ese no es el tema de este ejercicio que busca más bien una aproximación a la episteme en la cibercultura. Vivimos un *ethos* y una episteme que se singularizan en sus

<sup>1</sup> Ibid

<sup>2</sup> Fabbri se refiere a la teoría de la acción o giro semiótico, desde la narratividad, donde "según esta idea el lenguaje no sirve para representar estados del mundo sino, para transformar dichos estados, modificando al mismo tiempo a quien los produce y los comprende" (p.48) desde la acción del sujeto como agente que dinamiza y transforma el mundo y a su vez es transformado de manera transductiva.

propios contextos históricos, y en donde Foucault (1968) manifiesta el no-lugar del lenguaje, Carpentier encuentra lo real maravilloso<sup>1</sup>, y allí donde Chiampi (1968) observa la afasia para metaforizar la dificultad de nombrar las cosas frente a la realidad del Nuevo Mundo, Foucault observa la atopia, que contrasta con la necesidad de un orden en la cultura “el pensamiento sin espacio”. Lo que aquí se puede señalar no son solamente ángulos de visión sino actitudes mentales, es decir, formas distintas de ser y conocer, ¿y qué otra cosa es la episteme si no es una actitud mental, una forma de abordar el conocimiento?

Esta red de sentidos ofrece un campo pluricultural abierto a múltiples representaciones y formaciones discursivas y comunicativas que favorecen un anonimato social, cuya consecuencia es la necesidad de imaginar al otro y a los otros “fabricando” y proyectando un sinnúmero de identidades como caracterizaciones existen.

Vale la pena preguntarse si esta nueva actitud de la episteme se afirma en el mundo de la cibercultura, o si al contrario la crisis de la representación se profundiza en el tiempo de las nuevas tecnologías y la sociedad del conocimiento; si éstas propician un giro transversal en la construcción de sentido, o por el contrario ayudan a profundizar la crisis de la representatividad ya que el sistema digital con su virtualidad es una de las expresiones definidas de la representatividad en donde el cuerpo, el mundo físico y el territorio dejan lugar a la imagen, a la realidad virtual y a la subjetividad.

## CONCLUSIONES

Se puede pensar frente al avance tecnológico por su carácter digital, que fortalece el sentido de la representación, y la representación misma en la modernidad es indudablemente la forma del conocer y ha sido importante en el avance de las ciencias sociales, pero de lo que se trata hoy, como plantea Foucault, es que en el territorio en “las cosas”, se encuentra el sentido completo. La otra pregunta que nos podemos hacer es si hay cambios significativos en la episteme.

De hecho, este asunto conduce a un replanteamiento de las diversas maneras de pensar el mundo desde la sociosemiótica, valores que se proyectan a la vida económica, social, política y educativa. Así, Fabbri (2004) afirma que “al poner en evidencia la dimensión de la acción también introducimos la posibilidad de reflexionar sobre la pasión del signo (cuerpo), una cuestión que había sido eliminada del paradigma semiótico racionalista, cognitivista y representacional” (p. 62). Así que desde la acción como perspectiva multimodal se reconoce al sujeto como transformador en las dinámicas de cambio de los lenguajes y las corporeidades.

Desde la virtualidad, la acción o ser del cibernauta es un acto configurador de sentido del sujeto nómada desde el momento en que el sujeto se conecta a la red e inicia su movilidad. Con lo que asume diferentes posiciones o puntos de vista como sujeto, desde la constitución de sus identidades (creadas a partir de las interacciones multimediáticas), hasta la configuración de las relaciones sociales; la relación con los modos de trabajo y las maneras como desde la perspectiva en red, se configuran los modos de ser y hacer en el mundo.

Este acto semiótico performativo en el que se cumple la acción del sujeto en relación con el hecho social de proyectar el signo como provocador de múltiples sentidos, es una estrategia semiótica de acción pragmática donde las conexiones múltiples establecen esa performance. Así Fabbri (2004) plantea que: “[...] Al igual que la lingüística performativa, la semiótica también debe concebir los signos como acciones, como transformaciones de situaciones, como planteamiento y modificación de actores, espacios y tiempos”. (p. 62).

Ninguna sociedad se ha llamado antes *sociedad del conocimiento*, o de *la comunicación* y sin embargo en todas las sociedades ha habido comunicación y conocimiento. El énfasis puesto en el conocimiento, la tecnología y la comunicación en la sociedad actual, derivan de entender que estos son los determinantes del poder, de ese poder que no solamente constituye la economía y la política, sino que también construye su propio sentido epistemológico.

Las rupturas epistemológicas planteadas “donde se evidencia el tejido complejo en la producción de subjetividades, en relación con los sujetos nómadas y la sociedad-red, podemos identificar cómo el paso o la continuidad de la modernidad a la sociedad de la información, de alguna manera afecta e influye en los fenómenos culturales y en los proyectos de vida de los sujetos como productos de la globalización actual” (Ortiz, 2016, p.97). En términos de Lipovetsky (2006) este juego

<sup>1</sup> Carpentier Alejo. El reino de este mundo. Centro de estudios latinoamericanos Rómulo Gallegos. Caracas 2005. 160 págs.

de “la hipermodernidad funciona bien, según la lógica del reciclaje permanente del pasado, pues nada parece escapar a su imperio” (p. 35). Estas mediaciones tecnológicas, científicas y epistémicas:

cuya convergencia (comunicación-sociedad-usuarios) se anticipan de alguna manera a la construcción de un mundo sin jerarquías evidentes, permiten el uso democrático de la información y la imagen, lo que permea de manera transversal la transformación en las variables sociales, cognitivas, políticas, educativas, de producción de riqueza, etc.; desde el mercado de las TIC, la construcción del conocimiento, las subjetividades, las identidades y los cuerpos como medio de producción del sujeto autónomo, lo que pone en evidencia las necesidades de otras formas de acción y de lectura de la sociedad actual sobre las que bien vale la pena reflexionar desde la relación realidad virtual, realidad real, comunicación, sociedad y usuarios (Ortiz, 2016, p.74).

Queda entonces en este ejercicio de aproximación a la episteme contemporánea el esbozo de un enfoque que puede facilitar posteriormente un avance en la reflexión; la relación entre tecnología, ciencia y episteme, no es reciente, pero cobra en estos tiempos un nuevo significado que ya se enuncia en las preguntas por la incidencia de la tecnología en la regulación del pensamiento mediado por el lenguaje multimodal.

## REFERENCIAS

- [1] Anónimo (1965). *Popol Vuh*. Buenos Aires: Editorial Losada.
- [2] Augé, M. (2000). Los “no lugares” espacios del anonimato. Una antropología de la sobremodernidad. Barcelona: Gedisa.
- [3] Bauman, Z. (2010). *La globalización. Consecuencias humanas*. México: Fondo de Cultura Económica.
- [4] Bauman, Z. (2007). Los retos de la educación en la sociedad moderna líquida. España: Editorial Gedisa, S.A.
- [5] Barthes, R. (1971). *Elementos de semiología*. Madrid: Editor.
- [6] Cárdenas, A. (2015). *Lenguaje, analogía y sentido*. Doctorado Institucional en Educación. DIE: Universidad Pedagógica Nacional.
- [7] Carpentier, A. (2005). *El reino de este mundo*. Caracas: Centro de estudios latinoamericanos Rómulo Gallegos.
- [8] Chiampi, I. (2000) Barroco y Modernidad. México D.F: Fondo de cultura Económica.
- [9] Fabbri, P. (2004). *El giro semiótico*. Barcelona: Gedisa.
- [10] *Estudios previos*. Madrid: Cátedra.
- [11] Foucault, M. (1968), *Las palabras y las cosas*. Argentina: S.XXI Editores.
- [12] Hierro S. Pescador, J. (1980). *Principios de la filosofía del lenguaje*. Madrid: Alianza Editorial.
- [13] Kress, G., & Van Leeuwen, T. (2001). Introducción. En *Multimodal discourse. The modes and media of contemporary communication*, (pp. 1-23). Londres: Arnold.
- [14] Lipovetsky, G., & Charles, S. (2006). *Los tiempos hipermodernos*. Barcelona: Anagrama.
- [15] Ortiz, L (2016). Tesis doctoral. Configuración Sociosemiótica del chat: Una visión multimodal. UPTC. Colombia. [repositorio.uptc.edu.co/bitstream/001/1549/2/TGT-290.pdf](http://repositorio.uptc.edu.co/bitstream/001/1549/2/TGT-290.pdf)
- [16] <http://repositorio.uptc.edu.co/bitstream/001/1549/2/TGT-290.pdf>
- [17] Simondon, G. (2001). *El modo de existencia de los objetos técnicos*. Buenos Aires: Prometeo libros.
- [18] Verón, E. (1993). *La semiosis social. Fragmentos de una teoría de la discursividad*. Barcelona: Editorial Gedisa.
- [19] Von der Valde. L. (1990). Aproximación a la semiótica de Charles Peirce. *Revista Acciones Textuales, revista de teoría y análisis* N 2. Ciudad de México: Universidad Autónoma Metropolitana.

## **Gender Differences on Health Self-Perception of Older Adults as Primary Health Care in Brazil**

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### **Abstract**

The men-to-women ratio shows that women outnumber men, and aging-related aspects signal differences between older men and older women, confirming gender-based differences in aging. Our study aimed to foster discussion on gender and its consequences for health, considering the perceived and self-reported health of older people attending primary health care facilities. We carried out a quantitative descriptive cross-sectional study in the city of Fortaleza, Ceará, Northeastern Brazil, with people aged 60 or older who were individually interviewed using a questionnaire addressing sociodemographic data (age, gender, marital status, income, education), systemic health (self-reported diseases), oral health and perceived general health (present and past year health status). Participants were 821 older people whose age ranged from 60 to 100 years, with a mean of 69.7 years. There was a predominance of women (n=580; 70.6%). Participants presented low levels of education and income. Women were 1.3 times more likely to present systemic diseases and 1.5 times more likely to use medications compared with men. Women were more edentulous and presented more soft tissue problems than men. There were no differences in self-perceived general health and past year health status among the participants. The participants' self-reported health status revealed women are at an increased risk of getting sick, thus demonstrating gender-based inequalities in health among older adults. Public health policies need to improve people's access to primary care, especially in disadvantaged socioeconomic classes. Strategies should include financial support for health, retirement and social security policies to diminish gender-based inequalities in health.

**Keywords:** epidemiology; health, inequalities, gender; older, adults

### **Introduction**

The older population will increase from about 11% of the working-age population in 2005 to 49% by 2050 (World Health Organization [WHO], 2011a). These shifts in population age structure will lead to substantial additional fiscal pressures on publicly financed health care and pensions, along with substantial reductions in fiscal pressures for publicly financed

education (World Bank, 2011). The speed of demographic and epidemiological transitions has placed Brazil in a scenario characterized by multiple chronic conditions that can last for years. Therefore, aging in contemporary Brazil has become less difficult given the greater social recognition of older people and the sustainable and more equitable policies/initiatives targeted at this population (Ministério da Saúde, 2014).

Population aging implies a growing number of diseases and disabilities, and an increased use of health services by the population. Primary health care (PHC) is traditionally the site for health promotion, health prevention and rehabilitation sought by the population, including older adults. First contact, continuity or longitudinality, comprehensiveness and coordination of care are essential attributes of PHC (Starfield, 2002). These PHC characteristics are indispensable to promote quality of life for the aging process. Veras (2009) emphasizes that reaching old age can only be considered a real achievement if it adds quality to the additional years of life.

According to WHO (2015), despite the desire that increasing longevity is accompanied by an extended period of good health, the evidence to that is controversial. In fact, the idea that older people today are experiencing better health than their parents is less encouraging. The implications for older people and for society may be negative if the added years of life are dominated by declines in physical and mental capacities. Diseases are often associated with comorbidities and may lead to potential disabilities that affect functionality and hinder or prevent older people from performing their daily activities independently. Comorbidity is associated with worse health outcomes, more complex clinical management, and increased health care costs (Valderas, Starfield, Sibbald, Salisbury, & Roland, 2009). Therefore, it is important to deepen the analysis of aging in this setting.

The men-to-women ratio and aging-related aspects signal differences between older men and older women and confirm gender-based differences in aging. Women tend to live longer than men and present lower mortality rates worldwide; however, it does not mean they have better health conditions. Within this context, the World Health Organization highlights the interaction between biological and social determinants of women's health and show that gender inequalities increase the exposure and vulnerability to risks, limits the access to health care and information, and influences the health status outcomes (Organisation mondiale de la Santé [OMS], 2009). Additionally, analysis across gender suggests that females are in the most vulnerable position regarding healthcare equity in access and subsidy benefits (Montu & Arijita, 2015).

Given that, the present study aimed to foster discussion on gender and its consequences for health considering the perceived and self-reported health of older people attending primary health care facilities. It intends to contribute to the discussion of public policies such as health education and prevention strategies aimed to provide comprehensive care to the older person.

## Methods

A quantitative cross-sectional study was conducted with older people living in the city of Fortaleza, located in the State of Ceará, Northeastern Brazil. The city of Fortaleza is the fifth largest city in Brazil with 2,452,185 inhabitants, where women outnumber men in number (1,304,267 vs. 1,147,918 individuals) (Instituto de Pesquisa e Estratégia Econômica do Ceará [IPECE], 2012). Fortaleza has 109 primary health care centers that cover about 50% of the population.

The sample size was calculated for a simple random sample survey. Based on the number of older inhabitants (N=242.430) of the city of Fortaleza in 2012<sup>10</sup> (IPECE, 2012) using a margin of error of 5% and a 99% confidence interval, a sample size of 662 individuals was calculated. However, a total of 821 older people were assessed, which reduced sampling error.

In our study, older person is anyone aged 60 years or older, as defined by the Brazilian National Health Policy for Older People (Brasil, 2006). The study included older adults living in the city of Fortaleza, attending the municipal primary health care facilities, which agreed to participate and were able/fit to answer the questionnaire.

Data were collected through individual interviews using a questionnaire containing closed-ended questions (dichotomous and multiple choice) about socio demographic data (age, gender, marital status, income, education), systemic health (self-reported diseases), oral health and perceived general health (in the present and Last year health). Participants were interviewed at the city primary health care centers.

Three researchers (undergraduate and postgraduate students) were duly trained and informed the participants about the research objectives. The research project was approved by the Research Ethics Committee of the University of Fortaleza (Opinion No. 107/2009). Older adults, prior to participation in the research, provided written consent. In the case of illiterate

older adults, oral consent or written consent by their next of kin was provided. The participants were aware of the research objectives and anonymity was guaranteed.

Descriptive and bivariate analyses were performed, as well as a regression model. For the logistic regression model, the variables that expressed, in the bivariate analysis, a significant level lower than 0.20 were selected for analysis. Data were entered and analyzed using the SPSS 20.0 for windows (SPSS Inc., Chicago, IL, USA). Statistical significance was set at  $p \leq 0.05$ .

## Results

The research included 821 older people whose age ranged 60-100 years, with a mean age of 69.8 years ( $SD \pm 7.0$ ). The mean age of women was 69.8  $SD \pm 7.1$  and of men was 69.7  $SD \pm 6.7$  – no age difference was found between the two groups (Mann-Whitney test;  $p = 0.940$ ). However, there was a predominance of women ( $n = 580$ ; 70.6%) compared to men ( $n = 241$ ; 29.4%).

Table 1 presents the socio demographic characteristic of older adults by gender. Significant difference was found between gender and marital status ( $p < 0.001$ ) where men are mostly married ( $n = 147$ ; 61.0%) and women are predominantly widowed ( $n = 207$ ; 35.7%).

The majority was retired ( $n = 608$ , 74.1%), earned less than two minimal wages ( $n = 701$ , 85.4%) and were between 60 and 69 years of age ( $n = 441$ , 53.7%). Additionally, low schooling was observed in the majority of the older adults, where 24.5% ( $n = 201$ ) were illiterate and 48.8% ( $n = 401$ ) attended less than 5 years of school. Significant difference was noted among men and women regarding smoking (0.005) and alcoholism ( $p < 0.001$ ).

Table 2 shows the self-rated health of older people and highlights gender differences. Significant difference was found between gender and the existence of systemic disease ( $p < 0.001$ ), diabetes mellitus ( $p = 0.05$ ), osteoporosis ( $p < 0.001$ ), rheumatism ( $p = 0.011$ ) and medication use ( $p < 0.001$ ).

No difference was found between men and women when analyzing self-perception of current health status ( $p = 0.502$ ) and improvement of health comparing to the previous year ( $p = 0.182$ ). With regards to self-rated systemic diseases, 560 (68.2%) respondents reported having some health condition. Women reported more often than men that they had some systemic health problem ( $p < 0.001$ ) and were 1.8 times more likely to present systemic diseases. Women with Diabetes Mellitus ( $p < 0.050$ ), Osteoporosis ( $p < 0.001$ ), Rheumatism ( $p = 0.011$ ) were 1.4, 9.0 and 1.8, respectively, more likely to get sick. Similarly, women were 2.1 times more likely to use medications ( $p < 0.001$ ).

Table 3 presents data regarding oral health discomfort and gender. Women, more often than men, self-rated having dry mouth ( $p = 0.007$ ), difficulties chewing and swallowing food ( $p < 0.001$ ), and food taste problems ( $p = 0.019$ ).

Table 4 presents data related to older adults' oral health examination. Differences were observed among gender, where women were more edentulous ( $p = 0.009$ ), presented more red patches ( $p = 0.013$ ) than men, while men presented more dental decay ( $p < 0.05$ ), tartar ( $p = 0.040$ ), inflamed gingiva ( $p = 0.002$ ), and blisters ( $p = 0.016$ ) than women.

Binary logistic regression was performed in order to evaluate which variables are significant when the gender woman was set as the outcome of interest. The variables marital status, osteoporosis, red stain, medication intake, difficulty chewing and swallowing food and lesions were identified.

Table 5 presents the values of the logistic regression model, which showed a statistically significant results regarding older adults' gender and the variable marital status ( $p < 0.001$ ), osteoporosis ( $p < 0.001$ ), red stain in the mouth ( $p = 0.007$ ), taking medication ( $p = 0.022$ ), difficulty in chewing ( $p = 0.038$ ) and lesions and / or wounds ( $p = 0.017$ ).

## Discussion

In order to associate gender perspectives in health, there is a need for information about intervention and program policies and also about the functioning of health care facilities (WHO, 2010). In this sense, the World Health Organization (OMS, 2009) estimates that although women live longer than men because of biological and behavioral advantages, they present

a higher incidence of chronic diseases that can lead to dependency, and hence, demand greater attention to their health. The present study shows that women presented a poorer self-perceived health status compared with men.

Although age may influence health status (WHO, 2011a), it did not influence the results of the present study, as no age difference was found between men and women. There was, however, a difference between the percentage of men and women in the study group and in the inhabitants of the city of Fortaleza. According to the Brazilian Institute of Geography and Statistics (IBGE), the percentage of older women in the city of Fortaleza is 60.7% (Instituto Brasileiro de Geografia e Estatística [IBGE], 2010). In our study, 70.6% of the participants were women. The explanation for this may be based on the fact that women tend to use health care facilities more often than men (OMS, 2009).

In this study, the vast majority of the respondents were low-income people. Older women are often more socially and economically vulnerable than older men (WHO, 2003) and known to be more susceptible to poverty than males (OMS, 2009). In Brazil, a low-income population refers to individuals who receive less than two minimum wages (1 MW  $\pm$  260 US\$) (IBGE, 2010).

Several high-income countries have organized an important part of their budget for older people's social and health care. However, in low-income countries, the expenses related to older people's health care are commonly supported by the family, particularly by the female members of the family, which brings an extra burden to the women. It is important to mention that women traditionally perform an important support role in the family, which was originally more related to care, but more recently has also expanded to family financial support (OMS, 2009).

Küchemann (2012) emphasizes the extent to which men and women are dedicated to reproductive tasks. Her findings conclude that women spend 20.9 hours per week on household chores and care of their families, while men spend 9.2 hours weekly. For that reason, both the number of women who are devoted to reproductive work and the number of hours they spend on it are much higher when compared with the male population. Therefore, there is a clear work overload among women, which may have an influence on their health condition. According to the World Health Organization, several health problems experienced by older women result from risk factors to which they are exposed during their life<sup>8</sup>. On that note, it is important to observe that risk factor commonly linked to males, such as alcohol or tobacco consumption, have been gradually changing over the year, and are link to other cultural and socioeconomic factors. Data from the World Health Organization (WHO, 2009; WHO, 2005) describe higher tobacco consumption in women living in developed countries when compared with developing countries. In many contexts, use of tobacco and alcohol was traditionally higher among men compared with women. However, smoking and alcohol use rates among women have been increasing steadily given the changing gender roles in many societies. Nonetheless, women in high-income countries are more likely to engage in preventative health activities than men (Brittle & Bird, 2007).

The present study found some gender difference in older people's health perception, whereas, women described overall more systemic diseases than men. Specifically, women mentioned diabetes mellitus, osteoporosis, rheumatism and use of medication more than men, when questioned about their perceived health. These facts may explain the reason women have a higher rate of health system utilization than men. However, other facts, related to cultural and socioeconomic issues, may also influence utilization of health care service across genders (Saeed et al., 2016).

Silva, Sousa, Carnut and Rodrigues (2010) show that men are generally responsible for the family income and work at the same time as health facilities are functioning, thus hindering the search for treatment. Gomes, Nascimento and Araújo (2007) emphasize that men, for feeling invulnerable, expose themselves and end up getting more vulnerable. They also find possible explanations for the lower demand for health care services by men in the adoption of self-care practices, as well as in facts related to the cultural moorings of manhood (man seen as virile, strong and invulnerable), in the fear of discovering serious diseases, in the shame of body exposure, in the lack of available time to search treatment and in the lack of health units specific for their health problems. The same authors also state that as women have more access to health services, they also tend to have more access to health education programs developed by those units, which may influence their empowerment regarding their health, thus being able to identify their health situation more efficiently than men.

Women seem to not be afraid to find out about their health condition and seek treatment for it. While men seem to be afraid of this discovery, and thus, when it is discovered, the disease is already in an advanced stage. Perhaps this may partially explain why women's self report more chronic diseases (they know they have the disease), thus taking better care of

themselves, suffering less hospitalization and dying later. The results of the present study contribute to the presented line of reasoning, as the women interviewed described more systemic health problems and used more medication than men. Redondo-Sendino, Guallar-Castillón, Ramón Banegas and Rodríguez-Artalejo (2006) state that the factors that best explains the greater utilization of health care services by older women versus older men are the number of chronic diseases and the health-related quality of life.

Looking into the findings of the present research, it can be observed that women have more systemic diseases than men ( $p < 0.001$ ). Additionally, they are 1.3 times more likely to present such diseases than their male peers, which may be explained by the way society valorizes men and women and accepts different behavioral aspects for males and females, which may influence the risk of developing specific health problems and different results concerning general health (WHO, 2010).

Regarding cardiovascular diseases, researchers classify them as the main causes of death among women and men in Brazil (Mansur & Favarato, 2012). Once considered a male problem and the main cause of death of older people, they have been responsible for an increased number of deaths among women every year (WHO, 2009). The statistical similarity regarding cardiovascular problems can be reflected by the risk transition in the behavioral differences between men and women as highlighted by the World Health Organization, which reports, for instance, that alcohol and tobacco consumption was found to be often higher among men than women (OMS, 2009). However, these consumption trends, as previously mentioned, have started to converge between both sexes in many countries (WHO, 2011a).

Regarding the chronic conditions associated with neoplasias, six (54,5%) out of 11 people who reported having cancer/malign tumor were women. Cancer constitutes a public health concern worldwide. It is caused by multifactorial conditions that can act together for its onset, with the patterns of variation differing between the various risk factors and among men and women (Instituto Nacional de Câncer José Alencar Gomes da Silva [INCA], 2014; Siegel, Jiemin, Zhaohui, & Jemal, 2014). Taking the United States of America as an example, the average annual decline in cancer death rates was slightly larger among men (1.8%) than women (1.4%). Further progress can be accelerated by applying existing cancer control knowledge across all segments of the population, with emphasis on low socioeconomic and disadvantaged groups which, as previously seen, is where older women are more commonly found (WHO, 2011b).

Another chronic illness, Diabetes Mellitus, also revealed discrepancy among men and women (22.0% for men and 28.6% for women), indicating that the latter are more afflicted by this disease ( $p = 0.050$ ). These results are corroborated by researchers who assessed differences in health care between men and women and recognized biological and social conditions behind the terms "sex" and/or "gender" (Grant et al. 2009). Men and women with diabetes face different challenges in coping with their health condition, which results in implications for Public Health Care.

In the present study, the use of medication was higher among women ( $n = 439$ ; 75,7%) when compared to men ( $p < 0.001$ ). Loikas, Wettermark, Euler, Bergman and Schenck-Gustafsson (2013) found substantial differences in the prevalence and incidence of dispensed drugs between men and women. They believe that some differences may be rational and desirable and related to differences between the sexes in the incidence or prevalence of disease or by biological differences. However, other differences are more difficult to explain on medical grounds and may indicate unequal treatment.

The findings that oral discomfort, such as dry mouth, affect large proportions of older adults, especially women, are corroborated by Han, Suarez-Durall and Mulligan (2015) who reported that decreased salivary flow (dry mouth) affects the oral health of many older adults (dentate or edentulous) and highlighted the relationship of dry mouth with the use of multiple medications. This fact is pertinent to the findings of this study, since most of the older adults (71.1%) used medication, which may contribute to their oral discomfort.

The difference between men and women ( $p < 0.001$ ) with regard to difficulties chewing and swallowing food also stands out as an oral discomfort outcome. It is important to mention that the chewing and swallowing processes are critical to normal food intake. An adequate supply of saliva and oral care are indispensable to allow the proper functioning of these processes and maintain individuals' quality of life (Furuta & Yamashita, 2013).

Study has shown that women are more affected by dental losses than men (Takeuchi et al., 2017). In our study, 56.4% of the elderly were edentulous, with greater odds for women (1.5;  $p = 0.009$ ) to be affected by edentulism ( $p = 0.009$ ). It is understood that edentulism influences the difficulty of preparing food for swallowing. In the present study, we observed greater odds (1.9 times) of women having more chewing and swallowing problems than men ( $p = 0.038$ ), as well as greater

odds of having dry mouth (1.6;  $p=0.007$ ) and problems with taste food (1.7;  $p=0.019$ ). Japanese researchers assessed the relationship between the number of remaining teeth, bite force and swallowing problems in older people living independently and found a positive correlation between the number of remaining teeth and the maximum bite force (Okamoto et al., 2012; Okamoto et al., 2015). This result may, at least partially, explain the greater chance of women having chewing and swallowing problems than men, when they are also the ones with the highest odds of being edentulous - findings of our study.

Boyce and Shone (2006) emphasize that chewing problems associated with systemic diseases, tooth loss, can also interfere with taste sensations along with reduced saliva production. In addition to these problems, anxiety in the inability to taste and enjoy food can be responsible for a high degree of anxiety and depression in the elderly.

Overall, we observed that geriatric population is deficient regarding their oral health, with an elevated tooth loss, history of caries, and periodontal disease. These issues may be related to chronic disease destabilization, mastication difficulties, and impairment of oral quality of life, with direct and indirect effects on older adults' general quality of life and well-being (Gil-Montoya, Mello, Barrios, Gonzalez-Moles, & Bravo, 2015).

A regression model was performed in order to understand the inequalities among women and men regarding the variable investigated in the present study. The aim was to investigate which set of combined variables (and their weights) would relate to women. We observed that the geriatric women population were more prone to be widowed, have osteoporosis, red stain in their mouth, take more medication, more difficulties in mastication and swallowing, while males were more likely to have oral wounds than females. Understanding that there is a need for specific public policies that recognize the connection between gender and health, since older men and women can suffer systemic and chronic health problems and losses with aging, in addition to having behavioral and emotional changes, there is a need for greater epidemiological surveillance and investigation of social, behavioral, genetic and environmental factors that could help planning health care policies and interventions targeted at this population. It is clear that health policies need to improve people's access to primary care, especially in disadvantaged socioeconomic classes (Kuchermann, 2012), including financial support for health, retirement and social security policies, as well as health care, both at the community and at the health units (OMS, 2009).

The present study collected data inside the primary health care unit, interviewing older people who were either in treatment or looking for treatment. Therefore, it had the opportunity to observe the issue of gender in a subgroup that it is not widely explore.

Since the research universe was focused on a single municipality, its results cannot be extrapolated and characterize a limitation of this study. Nevertheless, the study was conducted in a large municipality of Brazil; therefore, its results may be similar to other places and hence, allow the measurement of the impact of diseases in addition to serving as a basis for equity in public health care policies. Further studies should enhance the research in this area.

## Discussion

The participants' self-reported health status revealed women are at an increased risk of getting sick, thus demonstrating gender-based inequalities in health among older adults.

Public health policies need to improve people's access to primary care, especially in disadvantaged socioeconomic classes. Strategies should include financial support for health, retirement and social security policies to diminish gender-based inequalities in health.

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## References

- [1] Boyce, J. M., & Shone, G. R. (2006). Effects of ageing on smell and taste. *Postgraduate Medical Journal*, 82, 239–241.
- [2] Brasil. Portaria nº 2528 de 19 de outubro de 2006. (2006). Aprova a Política Nacional de Saúde da Pessoa Idosa. Brasília: Ministério da Saúde.
- [3] Brittle, C., & Bird, C. E. (2007). Literature review on effective sex- and gender-based systems/models for care. Arlington, VA: Uncommon Insights.
- [4] Furuta, M., & Yamashita, Y. (2013). Oral Health and Swallowing Problems. *Current Physical Medicine and Rehabilitation Reports*, 1, 216–222. doi: 10.1007/s40141-013-0026-x.
- [5] Gil-Montoya, J. A., Mello, A. L. F., Barrios, R., Gonzalez-Moles, M. A., & Bravo, M. (2015). Oral health in the elderly patient and its impact on general well-being: a nonsystematic review. *Clinical Interventions in Aging*, 10, 461–467.
- [6] Gomes, R., Nascimento, E. F., & Araújo, F. C. (2007). Por que os homens buscam menos os serviços de saúde do que as mulheres? As explicações de homens com baixa escolaridade e homens com ensino superior. *Cadernos de Saúde Pública*, 23, 565–574.
- [7] Grant, J. F., Hicks, N., Taylor, A. W., Chittleborough, C. R., Phillips, P. J., & The North West Adelaide Health Study Team. (2009). Gender-specific epidemiology of diabetes: a representative cross-sectional study. *International Journal for Equity in Health*, 8, 6. doi:10.1186/1475-9276-8-6.
- [8] Han, P., Suarez-Durall, P., & Mulligan, R. (2015). Dry mouth: A critical topic for older adult patients. *Journal of Prosthodontic Research*, 59, 16–19.
- [9] Instituto Brasileiro de Geografia e Estatística (IBGE). (2010). Sinópse do Censo Demográfico 2010. Retrieved from: <https://censo2010.ibge.gov.br/sinopse/>.
- [10] Instituto de Pesquisa e Estratégia Econômica do Ceará (IPECE). (2012). INFORME 30: Perfil Municipal de Fortaleza. Tema 1: Aspectos Demográficos. Retrieved from: [www.ipece.ce.gov.br](http://www.ipece.ce.gov.br).
- [11] Instituto Nacional de Câncer José Alencar Gomes da Silva (INCA). (2014). Estimativa 2014: Incidência de Câncer no Brasil. Retrieved from: <http://www.inca.gov.br/estimativa/2014/estimativa-24042014.pdf>.
- [12] Küchemann, B. A. (2012). Envelhecimento populacional, cuidado e cidadania: velhos dilemas e novos desafios. *Revista Sociedade e Estado*, 27, 165–180.
- [13] Loikas, D., Wettermark, B., Euler, M., Bergman, U., & Schenck-Gustafsson, K. (2013). Differences in drug utilisation between men and women: a cross-sectional analysis of all dispensed drugs in Sweden. *BMJ Open*, 3, e002378. doi:10.1136/bmjopen-2012-002378
- [14] Mansur, A. P., & Favarato, D. (2012). Mortality due to Cardiovascular Diseases in Brazil and in the Metropolitan Region of São Paulo: A 2011 Update. *Arquivos Brasileiros de Cardiologia*, 99, 755–761.
- [15] Ministério da Saúde. (2014). Diretrizes para o cuidado das pessoas idosas no SUS: Proposta de modelo de atenção integral. Retrieved from: [http://bvsms.saude.gov.br/bvs/publicacoes/diretrizes\\_cuidado\\_pessoa\\_idosa\\_sus.pdf](http://bvsms.saude.gov.br/bvs/publicacoes/diretrizes_cuidado_pessoa_idosa_sus.pdf).
- [16] Montu, B., & Arijita, D. (2015). Inequity in hospitalization care: a study on utilization of healthcare services in West Bengal, India. *International Journal of Health Policy and Management*, 4, 29–38.
- [17] Okamoto, N., Morikawa, M., Yanagi, M., Amano, N., Tomioka, K., Hazaki, K.,... Kurumatani, N. (2015). Association of Tooth Loss With Development of Swallowing Problems in Community-Dwelling Independent Elderly Population: The Fujiwarakyo Study. *The journals of gerontology. Series A, Biological sciences and medical sciences*, 70, 1548–1554. doi:10.1093/gerona/glv116

- [19] Okamoto, N., Tomioka, K., Saeki, K., Iwamoto, J., Morikawa, M., Harano, A., & Kurumatani, N. (2012). Relationship between swallowing problems and tooth loss in community-dwelling independent elderly adults: the Fujiwara-kyo study. *Journal of the American Geriatrics Society*, 60, 849–53.
- [20] Organisation mondiale de la Santé (OMS). (2009). Résumé d'orientation. Les femmes et la santé: réalité d'aujourd'hui le programme de demain. Retrieved from: [http://whqlibdoc.who.int/hq/2009/WHO\\_IER\\_MHI\\_STM.09.1\\_fre.pdf](http://whqlibdoc.who.int/hq/2009/WHO_IER_MHI_STM.09.1_fre.pdf).
- [21] Redondo-Sendino, A., Guallar-Castillón, P., Ramón Banegas, J., & Rodríguez-Artalejo, F. (2006). Gender differences in the utilization of health-care services among the older adult population of Spain. *BMC Public Health*, 6, 155.
- [22] Saeed, B. I. I., Yawson, A. E., Nguah, S., Agyei-Baffour, P., Emmanuel, N., & Ayesu, E. (2016). Effect of socio-economic factors in utilization of different healthcare services among older adult men and women in Ghana. *BMC Health Services Research*, 16, 390. <http://doi.org/10.1186/s12913-016-1661-6>
- [23] Siegel, R., Ma, J., Zou, Z., & Jemal A. (2014). Cancer Statistics, 2014. *CA A Cancer Journal for Clinicians*, 64, 9–29.
- [24] Silva, K. C., Sousa, A. S., Carnut, L., & Rodrigues, C. S. (2010). Percepção sobre o acesso aos serviços de atenção primária à saúde bucal: uma perspectiva de gênero. *Journal of Management & Primary Health Care*, 1, 1-7.
- [25] Starfield, B. (2002). Atenção Primária: equilíbrio entre necessidades de saúde, serviços e tecnologia. Brasília: UNESCO, Ministério da Saúde.
- [26] Takeuchi, K., Ohara, T., Furuta, M., Takeshita, T., Shibata, Y., Hata, J., ..Ninomiya, T. (2017). Tooth Loss and Risk of Dementia in the Community: the Hisayama Study. *Journal of the American Geriatrics Society*, 65, e95–e100.
- [27] Valderas, J. M., Starfield, B., Sibbald, B., Salisbury, C., & Roland, M. (2009). Defining Comorbidity: Implications for Understanding Health and Health Services. *Annals of Family Medicine*, 7, 357-363. doi:10.1370/afm.983.
- [28] Veras, R. (2009). Population aging today: demands, challenges and innovations. *Revista de Saúde Pública*, 43, 548-54.
- [29] World Bank. (2011). Becoming Old in an Older Brazil. Implications of Population Aging on Growth, Poverty, Public Finance and Service Delivery. Retrieved from: [http://siteresources.worldbank.org/BRAZILINPOREXTN/Resources/3817166-1302102548192/Brazil\\_Aging\\_Full\\_Eng\\_final.pdf](http://siteresources.worldbank.org/BRAZILINPOREXTN/Resources/3817166-1302102548192/Brazil_Aging_Full_Eng_final.pdf).
- [30] World Health Organization (WHO). (2005). Gender and Health. Gender, Health and Alcohol Use. Retrieved from: <http://www.who.int/gender/documents/Alcoholfinal.pdf>.
- [31] World Health Organization (WHO). (2009). Women and health: today's evidence tomorrow's agenda. Retrieved from: [http://www.who.int/gender/women\\_health\\_report/en/](http://www.who.int/gender/women_health_report/en/).
- [32] World Health Organization (WHO). (2010). Gender, women and primary health care renewal: a discussion paper. Retrieved from:

[http://apps.who.int/iris/bitstream/handle/10665/44430/9789241564038\\_eng.pdf;jsessionid=74E796C3CD30073682D3780F39F8DC4D?sequence=1](http://apps.who.int/iris/bitstream/handle/10665/44430/9789241564038_eng.pdf;jsessionid=74E796C3CD30073682D3780F39F8DC4D?sequence=1).

- [33] World Health Organization (WHO). (2011a). Global Health and Aging. National Institute on Aging. National Institutes of Health. U.S. Department of Health and Human Services. NIH Publication No. 11-7737. 2011a. Retrieved from: [http://www.who.int/ageing/publications/global\\_health.pdf](http://www.who.int/ageing/publications/global_health.pdf).
- [34] World Health Organization (WHO). (2011b). Global status report on noncommunicable diseases 2010. Retrieved from: [http://whqlibdoc.who.int/publications/2011/9789240686458\\_eng.pdf?ua=1](http://whqlibdoc.who.int/publications/2011/9789240686458_eng.pdf?ua=1).
- [35] World Health Organization (WHO). (2015). World report on ageing and health. Geneva: World Health Organization. Retrieved from: [http://apps.who.int/iris/bitstream/handle/10665/186463/9789240694811\\_eng.pdf;jsessionid=E2ED9C6BE1B6CF2D54707CD2BDCA500C?sequence=1](http://apps.who.int/iris/bitstream/handle/10665/186463/9789240694811_eng.pdf;jsessionid=E2ED9C6BE1B6CF2D54707CD2BDCA500C?sequence=1).

Table 1. Analysis of the association between gender and sociodemographic characteristics of older adults attending primary care services. Fortaleza, Ceará, 2014.

Variables	Women (n= 580)	Men (n=241)	Total	RP (95%CI)	p*
	n (%)	n (%)	n (%)		
Marital status					<0.001
Single	94 (16.2)	27 (11.2)	121 (14.7)	2.4 (1.5 - 3.9)	
Married	209 (36.0)	147 (61.0)	356 (43.4)	1	
Divorced	70 (12.1)	26 (10.8)	96 (11.7)	1.9 (1.2 - 3.1)	
Widowed	207 (35.7)	41 (17.0)	248 (30.2)	3.6 (2.4 - 5.3)	
Age					0.854
60-69	310 (53.4)	131 (54.4)	441 (53.7)	1.1 (0.6 - 1.8)	
70-79	215 (37.1)	85 (35.3)	300 (36.5)	1.1 (0.7 - 2.0)	
80+	55 (9.5)	25 (10.4)	80 (9.7)	1	
Retired					0.927
Yes	429 (74.0)	179 (74.3)	608 (74.1)	1.0 (0.7 - 1.4)	
No	151 (26.0)	62 (25.7)	213 (25.9)	1	
Income**					0.436
Up to 2 MW	501 (86.4)	200 (83.0)	701 (85.4)	1.3 (0.9 - 2.0)	
2-5 MW	72 (12.4)	38 (15.8)	110 (13.4)	1	
More than 5 MW	7 (1.2)	3 (1.2)	10 (1.2)	1.2 (0.3 - 5)	
Years of study					0.146
None	139 (24.0)	62 (25.7)	201 (24.5)	1.2 (0.7 - 2.0)	
Up to 5	283 (48.8)	118 (49)	401 (48.8)	1.3 (0.8 - 2.0)	
6-9	69 (11.9)	37 (15.4)	106 (12.9)	1	

10 or more	89 (15.3)	24 (10.0)	113 (13.8)	2.0 (1.1 - 3.6)	0.005
Smoking					
Yes	68 (11.7)	46 (19.1)	114 (13.9)	1	
No	512 (88.3)	195 (80.9)	707 (86.1)	1.2 (1 - 1.4)	<0.001
Drinking					
Yes	25 (4.3)	60 (24.9)	85 (10.4)	1	
No	555 (95.7)	181 (75.1)	736 (89.6)	2.6 (1.8 - 3.6)	

\*Chi-squared test. \*\* The Brazilian minimum wage is approximately US\$ 260.00 per month

Table 2. Analysis of the association between gender and health variables in older adults attending primary care services. Fortaleza, Ceará, 2014.

Variables	Women (n= 580)	Men (n=241)	Total	RP (95%CI)	p
	n (%)	n (%)	n (%)		
General Health					0.502 <sup>1</sup>
Excellent	116 (20.0)	57 (23.7)	173 (21.1)	1	
Reasonable	330 (56.9)	130 (53.9)	460 (56.0)	1.2 (0.6 - 2.5)	
Bad	134 (23.1)	54 (22.4)	188 (22.9)	1.2 (0.5 - 2.8)	
Current health vs health in the past year					0.182 <sup>1</sup>
Better	137 (23.6)	45 (18.7)	182 (22.2)	1.4 (0.7 - 2.9)	
Same	325 (56.0)	151 (62.7)	476 (58.0)	1	
Worse	118 (20.3)	45 (18.7)	163 (19.9)	1.2 (0.6 - 2.5)	
Systemic diseases					<0.001 <sup>1</sup>
Yes	417 (71.9)	143 (59.3)	560 (68.2)	1.8 (1.0 - 3.2)	
No	163 (28.1)	98 (40.7)	261 (31.8)	1	
Diabetes Mellitus					0.050 <sup>1</sup>
Yes	166 (28.6)	53 (22.0)	219 (26.7)	1.4 (0.7 - 2.7)	
No	414 (71.4)	188 (78.0)	602 (73.3)	1	
Cardiovascular diseases					0.766 <sup>1</sup>
Yes	293 (50.5)	119 (49.4)	412 (50.2)	1.0 (0.6 - 1.8)	
No	287 (49.5)	122 (50.6)	409 (49.8)	1	
Cancer					0.238 <sup>1</sup>
Yes	6 (1)	5 (2.1)	11 (1.3)	1	
No	574 (99.0)	236 (97.9)	810 (98.7)	2.0 (0.2 - 21.8)	
Tuberculosis					1.000 <sup>2</sup>

Yes	2 (0.3)	1 (0.4)	3 (0.4)	1	
No	578 (99.7)	240 (99.6)	818 (99.6)	1.2 (0 - 111.1)	
Leprosy					1.000 <sup>2</sup>
Yes	2 (0.3)	1 (0.4)	3 (0.4)	1	
No	578 (99.7)	240 (99.6)	818 (99.6)	1.2 (0 - 111.1)	
Osteoporosis					<0.001 <sup>1</sup>
Yes	163 (28.1)	10 (4.1)	173 (21.1)	9.0 (3.1 - 26.5)	
No	417 (71.9)	231 (95.9)	648 (78.9)	1	
Rheumatism					0.011 <sup>1</sup>
Yes	98 (16.9)	24 (10.0)	122 (14.9)	1.8 (0.8 - 4.2)	
No	482 (83.1)	217 (90.0)	699 (85.1)	1	
Nephritis					0.860 <sup>1</sup>
Yes	16 (2.8)	2 (0.8)	18 (2.2)	3.4 (0.3 - 40.1)	
No	564 (97.2)	239 (99.2)	803 (97.8)	1	
Vision problems					0.879 <sup>1</sup>
Yes	460 (79.3)	190 (78.8)	650 (79.2)	1.0 (0.5 - 2)	
No	120 (20.7)	51 (21.2)	171 (20.8)	1	
Hearing problems					0.386 <sup>1</sup>
Yes	163 (28.1)	75 (31.1)	238 (29.0)	1	
No	417 (71.9)	166 (68.9)	583 (71.0)	1.2 (0.6 - 2.1)	
Use of medication					<0.001 <sup>1</sup>
Yes	439 (75.7)	145 (60.2)	584 (71.1)	2.1 (1.1 - 3.8)	
No	141 (24.3)	96 (39.8)	237 (28.9)	1	

<sup>1</sup>Chi-squared test; <sup>2</sup> Fisher's exact test

Table 3. Analysis of the association between gender and oral discomfort variables in older adults attending primary care services. Fortaleza, Ceará, 2014.

Variables	Women (n= 580)	Men (n=241)	Total	OR (95%CI)	p
	n (%)	n (%)	n (%)		
Dry mouth					0.007
Yes	226 (39.0)	70 (29.0)	296 (36.1)	1.6 (1.2 - 2.2)	
No	354 (61.0)	171 (71.0)	525 (63.9)	1	
Difficulty chewing and swallowing food					0.001
Yes	164 (28.3)	42 (17.4)	206 (25.1)	1.9 (1.3 - 2.8)	
No	416 (71.7)	199 (82.6)	615 (74.9)	1	

Problems with the taste of food					0.019
Yes	103 (17.8)	27 (11.2)	130 (15.8)	1.7 (1.1 - 2.7)	
No	477 (82.2)	214 (88.8)	691 (84.2)	1	
Burning mouth sensation					0.098
Yes	45 (7.8)	11 (4.6)	56 (6.8)	1.8 (0.9 - 3.5)	
No	535 (92.2)	230 (95.4)	765 (93.2)	1	
Pain for no apparent reason					0.115
Yes	70 (12.1)	20 (8.3)	90 (11.0)	1.5 (0.9 - 2.5)	
No	510 (87.9)	221 (91.7)	731 (89.0)	1	
Mouth swelling					0.404
Yes	35 (6.0)	11 (4.6)	46 (5.6)	1.3 (0.6 - 2.6)	
No	545 (94.0)	230 (95.4)	775 (94.4)	1	
Voice changes					0.690
Yes	48 (8.3)	22 (9.1)	70 (8.5)	0.9 (0.5 - 1.5)	
No	532 (91.7)	219 (90.9)	751 (91.5)	1	

Chi-squared test

Table 4. Analysis of the association between gender and oral health variables in older adults attending primary care services. Fortaleza, Ceará, 2014.

Variables	Women (n= 580)	Men (n=241)	Total	OR (95%CI)	p
	n (%)	n (%)	n (%)		
Edentulism					0.009
Yes	344 (59.3)	119 (49.4)	463 (56.4)	1.5 (1.1 – 2.0)	
No	236 (40.7)	122 (50.6)	358 (43.6)	1	
No visible tooth decay					0.088
Yes	169 (71.9)	77 (63.1)	246 (68.9)	1.5 (0.9 - 2.4)	
No	66 (28.1)	45 (36.9)	111 (31.1)	1	
Presence of calculus					0.040
Yes	174 (30.0)	90 (37.3)	264 (32.2)	0.7 (0.5 – 1.0)	
No	406 (70.0)	151 (62.7)	557 (67.8)	1	
Sore gums					0.002
Yes	116 (20.0)	72 (29.9)	188 (22.9)	0.6 (0.4 - 0.8)	
No	464 (80.0)	169 (70.1)	633 (77.1)	1	
One or two visible tooth decays					0.019
Yes	54 (9.3)	36 (14.9)	90 (11.0)	0.6 (0.4 - 0.9)	
No	526 (90.7)	205 (85.1)	731 (89.0)	1	
Three or more visible tooth decays					0.007

Yes	11 (1.9)	13 (5.4)	24 (2.9)	0.3 (0.1 - 0.7)	
No	569 (98.1)	228 (94.6)	797 (97.1)	1	
Residual root					0.105
Yes	59 (10.2)	34 (14.1)	93 (11.3)	0.7 (0.4 - 1.1)	
No	521 (89.8)	207 (85.9)	728 (88.7)	1	
Soft tissue injuries					0.077
Yes	203 (35.0)	69 (28.6)	272 (33.1)	1.3 (0.9 - 1.8)	
No	377 (65.0)	172 (71.4)	549 (66.9)	1	
Blisters					0.016
Yes	49 (8.4)	9 (3.7)	58 (7.1)	2.4 (1.2 - 5.0)	
No	531 (91.6)	232 (96.3)	763 (92.9)	1	
Lesions and/or wounds					0.101
Yes	23 (4.0)	16 (6.6)	39 (4.8)	0.6 (0.3 - 1.2)	
No	557 (96)	225 (93.4)	782 (95.2)	1	
Red patches					0.013
Yes	120 (20.7)	32 (13.3)	152 (18.5)	1.7 (1.1 - 2.6)	
No	460 (79.3)	209 (86.7)	669 (81.5)	1	
White patches					0.087
Yes	17 (2.9)	13 (5.4)	30 (3.7)	0.5 (0.2 - 1.0)	
No	563 (97.1)	228 (94.6)	791 (96.3)	1	

Chi-squared test

Table 5. Binary logistic regression model for the female gender in older adults attending primary care services. Fortaleza, Ceará, 2014.

Variables in the model	OR for female gender	(95%CI)	p
Marital status			<0.001
Married	2.5 (1.8 - 3.5)		
Unmarried	1		
Osteoporosis			<0.001
Yes	7.8 (4.0 - 15.5)		
No	1		
Red patches			0.007
Yes	1.9 (1.2 - 2.9)		
No	1		
Use of medication			0.022
Yes	1.5 (1.1 - 2.1)		
No	1		
Difficulty chewing and swallowing food			0.038

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Yes	1.5 (1.0 - 2.3)	
No	1	
Lesions and/or wounds		0.017
Yes	0.4 (0.2 - 0.9)	
No	1	

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Wald's test

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## Design of a Conceptual Model for Improving Company Performance Based on Lean Management Applying the Viable System Model (VSM)

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### Abstract

Designing, changing and adapting organizations to secure viability is challenging for companies. Researchers often fail to holistically design or transform organizations. Thus, the aim of this study is to propose a holistic approach how organizations can be designed, changed or managed considering also its implications to production management following lean management principles. Hereby the Viable System Model was applied. This structure can be applied to any kind of structured organization and for its management with goals to be achieved in modern society; however focus of the research is the cluster of manufacturing and assembly companies. Goal of the developed organizational model is to be able to react to all potential company environments by taking decisions regarding organization and production management functions correctly and in the right moment based on the needed information. To ensure this, standardized communication channels were defined. In conclusion this proposed approach enables companies to have internal mechanisms to secure viability and also in production to reduce necessary stocks, lead times, manpower allocation and leads to an increase of the service level to the final customer.

**Keywords:** Cybernetics, Company performance, Lean management, Organizational Model, Production management, Viable System Model

### 1. Introduction

Developing organizations capable to deal with the present and future competitiveness needs is a challenge (Schuh & Stich, 2013, p. 2). Achieving sustainable long-term advantages will no longer ensure the competitiveness of companies. This fact also increases the complexity of manufacturing and assembly planning and control processes. This situation results in a significant increase of information and communication flows which the company has to manage in order to secure its viability.

Moreover it can be said that information is the interconnection element in organizations. It is needed for policy definition, decision-making, management, control, coordination, etc. Problems with information flows lead to negativ impact in the organization.

Furthermore global logistics flows have increased drastically in recent years due to a globalized world economy that introduces inherent challenges for establishing international businesses (Frazelle, 2002, p. 10). In this international competition the compliance of the service level is adding more pressure on supply flexibility (Siller, 2011, p. 1). In addition demand volatility in almost every industry sector seems to be higher than it was in the past due to shortened product and technology life cycles, sales promotions, reorder quantities and unplanned disruptions (Christopher, 2005, p. 233). As a result, many producers are confronted with intransparent and volatile demand behaviors that cause large deviations in sales forecasts (Wildemann, 2008, pp. 168-169). As a consequence, failures in forecasts have grown steadily in recent years despite the use of information systems for that purpose (Christopher, 2011, p. 153).

Across all industries, companies are in an environment with increasing competitive pressure (Schuh et al., 2011, p. 843). The main factors that favor this situation are the increasing globalization and the resulting competition situation that causes an intense reduction of product life cycles as well as a growing individualization of the final products according to specific customer criteria (Abele & Reinhart, 2011, p. 1). This evolution is combined with the demands of customers who want to be served with shorter delivery times (Tu & Dean, 2011, p. 1) as well as with the increasing product variants in manufacturing and assembly processes that expose planning and control logistics to new challenges (Auerbach et al., 2011, p. 797).

The consequences for trade between companies after the financial and economic crisis are observable today which cause an increasing demand for flexibility and adaptability (Schuh, 2009, p. 2). The reduction of international trade barriers requires intense global cooperation as well as an increase in business complexity (Schulte, 2008, p. 457). In addition, due to climate change, the proliferation of natural disasters and their consequences are an additional source of uncertainty for logistics and production of some industries (Wöhrle, 2012, pp. 22-23). As a result, the sustainability and energy efficiency aspects have gained importance as a cause of the energy transition and the increase of energy prices. In this context, companies are increasingly obliged to carry out individualized and flexible logistics planning and control (Schuh & Roesgen, 2006, p. 7).

The trends shown take us in their sum to an increase in the complexity of relationships and processes (Placzek, 2007, p. 2). As a result many companies lose competitiveness due to a slow adaptation to their environment. Therefore the capability to deal with changing customer requirements, demand volatility and new product launches is acquiring more and more importance for winning competitive advantage (Capgemini, 2010, p. 5). This moves the prioritization of the supply chain goals to customer service, delivery performance and flexibility, instead of being based only on costs (McKinsey, 2011, p. 11). In this context, lean management defines the methods, concepts and principles how to reach these goals. While the economic effects of lean methods have been described in practice, there is still a demand for a scientific basis to explain how lean methods should act in companies (Herrmann et al., 2008, p. 1) and how these concepts should develop over time depending on external environment.

Many approaches have been considered in order to solve the problem of organizational alignment with the environment in manufacturing companies. However most of them have failed due to several reasons, such as lack of information, coordination or control that leads to take strategic decisions neither at an optimal point in time nor in an optimal way. In addition, how to deal with it is a great challenge and in a highly competitive world it is essential to adapt quickly to changes to be successful. Therefore the main research objective is to make companies more flexible, so that the company can face any kind of environment because its internal structure and communication enables a fast decision-making to align the company with market conditions. The paper will be based on the Viable System Model (VSM). By applying the Viable System Model, the organization is transformed into an autonomous system capable of adapting to constant environment changes (Beer, 1959, p. 17). For a company it is fundamental to meet customers' requirements. Although minimization of costs is always a priority, a global trend advocates following lean management principles in order to improve our customers' satisfaction and company revenues.

To analyse this challenge a conceptual model is designed for an organization following lean management principles summarized in the literature in terms of the seven "zeros". In 1983 Edwards (1983) introduced the "seven zeros" – zero defects, zero lot size, zero set-ups, zero breakdowns, zero handling, zero lead time, zero surging – as JIT goals, which pursue the goal of avoiding all forms of waste, especially inventories (Edwards, 1983). Later Hopp and Spearman described the seven zeros corresponding to the different types of waste (Hopp & Spearman, 2008). These "zeros" are unachievable in practice, but the goals inspire an environment of continual improvement (Sheikh-Sajadieh et al., 2013, p. 263):

- Zero defects
- Zero inventory
- Zero accidents
- Zero delays
- Zero breakdowns
- Zero changeovers or setup times
- Zero waste

The methodology can be applied to any kind of organization; however producing organizations are the main research focus. All these organizations have a target system defined by the following parameters: performance, delivery service and costs (Schuh & Stich, 2013, p. 22).

The initial hypothesis is that an organization built on the basis of lean management principles using the structure of the VSM will be able to react faster to environment changes and therefore its application will have a positive impact on the achievement of short, medium and long-term goals of every producing company. The VSM approach increase the adaptability of companies to face all future potential scenarios because the company is able to take strategic decisions that will influence later the tactical and operative levels. Therefore it is capable of implementing measures to reduce the impact of environment uncertainty and also to see developments in the environment to prepare strategies and internal configurations for the future.

In the area of productive systems of the department of Construction and Fabrication Engineering at the National Distance Education University (UNED) an approach has been developed to solve the problem of organizations and production systems with the help of the Viable System Model. The aim of the research is to propose a self-regulating approach how to design organizations and production systems.

## 2. Methodological approach and literature review

In this project the objective is the development of an organizational and production management model under the principles of lean management using the Viable System Model (VSM). The method used to reach this goal was the following:

Definition of methodological approach:

Comparison of the VSM with other approaches

Application cases of VSM

Literatura review for:

Cybernetics, system theory and Viable System Model

Organizational functions

Production management tasks

Lean management principles

Conceptual model development:

Development of a target system for an organization and for a production system

Production management tasks according to planning horizon levels

Definition of recursion levels and operative units

Association of tasks to recursion levels & operative units

Identification of the needed information flows between operative units and recursion levels

After having described the methodology, a comparison of the VSM, a cybernetic model, with other approaches was done. As described in the literature the VSM is an unmatched conceptual and methodological tool for the modeling and design of organizations and its areas with the goal of being viable (Schwaninger et al., 2008, p. 16). Thus, the aim of the research is to propose a self-regulating approach how designing and transforming organizations based on lean management principles. For this reason, the Viable System Model is applied for this purpose. Applying the VSM means to implement the organizational structure of any viable or autonomous system in an organization of a producing company.

To validate the research methodology, research and practical applications using cybernetics, system theory and the VSM were searched. Many authors have used the VSM as basis to describe and develop models how to deal with complex challenges of social and industry. Some of the topics worked and that give an indication of the scientific value of the approach are:

Herold (1991) developed a concept for the organization of a company based on the principles of the VSM. In this approach, the general structure of the company is analyzed first by means of a questionnaire (Herold C., 1991, pp. 74-76).

Herrmann (2008) described lean methods in terms of attenuating and amplifying variety based on the findings of the VSM (Christoph Herrmann, C. et., 2008).

Brosze (2011) developed a reference model for the management of production systems with adaptability. As a target group, it is focused on "make-to-order" manufacturing (Brosze, 2011).

Erbsen (2012) pursued the objective of optimizing patient care in disease-oriented centers in university hospitals (Erbsen, 2012).

Kompa (2014) research was dedicated to the problem of the order booking process in situations of overload in mass production companies (Kompa, 2014).

Schürmeyer (2014) pursued the objective of developing a reference model for production program planning during launch processes (Schürmeyer, 2014).

Hering (2014) designed an inter-business design concept for a coordinated production planning in real time in the consumer goods industry (Hering, 2014).

Groten (2017) described how to design integrated distribution networks based on the Viable System Model and validated the results with a simulation model comparing the VSM approach versus classical distribution planning concepts (Groten, 2017).

### 3. Basics of the Viable System Model, organization & production management and lean management principles

#### **From cybernetics and system theory to the Viable System Model (VSM)**

Cybernetics has its origin in the 40s of the last century and is often related to the work of the mathematician Norbert Wiener who studied the regulatory mechanisms and information structures existing in living organisms in order to make them understandable and possible to use (Strina, 2005, pp. 11-13). From the point of view of historical development, cybernetics can be considered part of systems theory. However, system theory focuses on the development of systems, while cybernetics explores the control and operation of systems (Schwaninger, 2004, p.4). Cybernetics deals with all forms of behavior insofar as they are regular, determined or reproducible. As a result, it takes care about what a system does (Ashby, 1957, p.1).

An important result of Cybernetics is that all viable systems have an invariant structure. Therefore, a system will only be viable if and only if it has this structure (Malik, 2006, p.80). A viable system is also able to adapt itself to changing scenarios of its environment. To do this, the system evaluates and learns from these situations, developing its behavior while maintaining its identity (Gomez, 1978, p.21).

An organization is no longer studied as a single company, except in the context of its relationship with the environment. Due to this, the topics such as capacity for adaptation, flexibility, ability to learn, evolution, self-regulation and self-organization are of main interests. The main problem that Cybernetics has to deal with is how to deal with environment complexity. It is concluded that the means to solve this problem is the structure or organization of a viable system. For this purpose, the Viable System Model (VSM), a cybernetic management model, was developed by Stafford Beer throughout his life (Espejo & Harnden, 1989, p.57). Beer deduced the VSM by taking the central nervous system of the human being and cybernetics as basis in order to deal with complex systems (Schuh et al., 2011, p.434). The minimum requirements that a system must meet to ensure its viability are derived when analyzing the central nervous system (Beer, 1972, p.198).

The VSM is built on three main principles: viability, recursivity and autonomy. Viability is a property of every system that is able to react to internal and external perturbations in order to maintain separate existence (Schuh et al., 2011, p.434). The cybernetic model of every viable system consist always in a structure with five necessary and sufficient subsystems that are in relation in any organism or organization that is able to conserve its identity with independency of its environment (Espejo & Harnden, 1989, pp.21-22).

System 1 consist of semi-autonomous operating units that react to the development of their environment and in which each unit coordinates itself with the other operating units, with the aim of maintaining its own stability and the stability of the entire company (Beer, 1972, pp.214-217). The plan of the operating units is to execute and control their tasks autonomously within defined limits (Brecher et al., 2011, p.434).

System 2 is the coordination system that enables the units of system 1 to solve their own problems allowing decentralized decision-making and solve conflicts between those units (Espejo & Harnden, 1989, p.287). It also carries out the coordination of the operative units regulatory centres. It is an interface between Systems 1 and 3 (Beer, 1972, p.220).

System 3 is the central control system of the operating units. It performs the control of current operations (Espejo & Harnden, 1989, p.281). It also analyzes the viability of the strategic input provided by the system of 4 and converts it into tactical operations (Brecher et al., 2011, p.435).

System 3\*: performs the validation of the information that flows between system1-3 and 1-2-3 through the audit and monitoring of activities (Schwaninger, 2008, p.84). This system sends information that does not appear in the official reports, that is, informal channels (Malik, 2006, p.455).

Systems 1, 2 and 3 regulate internal stability and try to optimize performance within a given structure and criteria (Beer, 1972, p. 230). System 3 is the coordination center of all internal areas of the company condering the goals for the whole company since systems 1 and 2 can only compare deviations locally (Malik, 2006, pp.131-132).

System 4 is the strategic system that makes strategic analysis of the external environment and the internal capacity to deal with it and, based on it, takes the necessary strategic decisions (Brecher et al., 2011, p. 435). The internal stability has only sense if the external factors are considered. Reception, elaboration and transmission of information from the environment are tasks of System 4 in order to provide external stability (Malik, 2006, p.90). It is a set of activities, which feeds the highest level of decision making. It must contain a model that represents the idea of the firm in order to inform the top management about which type of firm they are running (Beer, 1972, p.233). Therefore, it considers both external and internal conditions in order to initiate changes and development. To make it possible, systems 3 and 4 maintain a continuous dialogue (Espejo & Harnden, 1989, p.281).

System 5 represents the normative level that makes the balance between current operations (System 3) against future's needs (System 4). When there is no balance, System 5 plays the role of judge (Espejo & Harnden, 1989, p.293). It defines the rules that determine how the global system behaves. It is continuously designing the future of the system through the elaboration and choice of behavioral alternatives. Here the company policy is created, through a close interaction between the management systems, 3, 4 and 5 (Malik, 2006, p.91). System 5 is the top management and it determines policies and establishes the goals to take decisions (Beer, 1972, p 253).

### **Organizational functions and production management tasks**

Organizational functions as described from Porter can be divided into primary and support functions, which are activities that described the value chain of an organization that are related to its competitive strength. Primary activities are directly concerned with the creation or delivery of a product or service. They can be grouped into five main areas: inbound logistics, operations, outbound logistics, marketing and sales, and service. Primary activities are linked to support activities which help to improve their effectiveness or efficiency. There are four main support activities: procurement, technology development (including R&D), human resource management, and infrastructure (IT systems for planning, finance, quality, information management etc.) (Porter, 1985).

The production system includes functions of inbound & outbound logistics as well as operations and their related support activities. Production is the foundation of human activity. Natural resources are transformed into useful products through production processes to meet the needs of society (Zelenović, 1982, p.319). The productive system is characterized by the process of transformation of materials into finished products including the related responsibilities of production planning and production control (Santamaría Peraza, 2012, p.42). The current understanding of production management varies widely from an authoritarian point of view of planning and production control to a global understanding of production management as management, design and development of the entire manufacturing company (Friedli & Schuh, 2012, p.28).

Production management contains the tasks of design, planning, monitoring and control of the productive system and business resources such as people, machines, material and information (Nyhuis, 2008, pp.249-273). The multi-dilemma of production planning originates discussions over and over again in the context of divergent objectives. This conflict of goals is shown in Figure 1 (Friedli & Schuh, 2012, p.36).

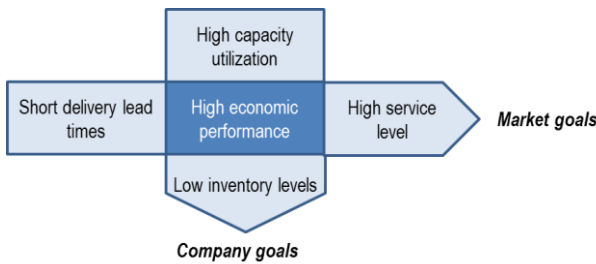


Figure 1: Multi-dilemma of production planning (Friedli & Schuh, 2012, p.36).

From customer perspective goals are short delivery times and high delivery reliability. From company point of view, the high utilization rates are indispensable due to high fixed costs. This must be achieved simultaneously with a minimum inventory to keep the working capital costs under control. Therefore, business goals are in conflict with market objectives which increase management complexity in manufacturing companies (Friedli & Schuh, 2012, pp.36-37).

The strategic perspective of production management anticipates relevant change drivers, triggers the adjustment of the organization to be adapted to the conditions of its environment in order to give a strategic direction to the company based on the objectives, principles and standards defined at the normative level. The operational objective of production management is the supply of the products and services of a company in the quality and quantity required at a given date and at the lowest possible cost (Kämpf et al., 2007, pp.5-32). The basic tasks of the operational production management are the production program planning, the order management, the production requirements planning and the planning and control of internal production as well as external production in suppliers.

To explain the tasks of production management, the Aachener PPC (Production Planning & Control) model, which is a reference model for its analysis, evaluation and design, is used (Schuh et al., 2012, p.29).

Network tasks	Core tasks		Cross tasks		
Network configuration	Master Production Program		Order management	Inventory management	Controlling
Network sales planning	Production requirements planning				
Network requirements planning	Planning & control of outsourced production	Planning & control of own production			
Data administration					

Figure 2: Production management tasks according to the Aachener PPC model (Schuh et al., 2012, p.30)

Network tasks summarize all the planning tasks that are carried out in relation to production plant network. The core tasks are all tasks related to production management and control with focus on the individual company. The transversal or cross tasks are planning and control tasks that contains elements of the production network as well as of the core tasks and therefore have a character of coordination between both. All tasks are distinguished vertically in Figure 2 according to their strategic, tactical or operational nature. For performing these tasks, equipment and personnel resources are planned with an increasing degree of detail (Schuh et al., 2012, pp.30-32).

The tasks are assigned according to their temporal relevance at different planning levels. According to the St. Gallen management model, management levels are divided into normative, strategic and operational planning levels (Bleicher, 2004, p.80). In the past, the main focus was on operational and tactical problems, however to successfully manage logistics in the future, an active strategic planning level is also required (Schuh & Stich, 2013, p.1).

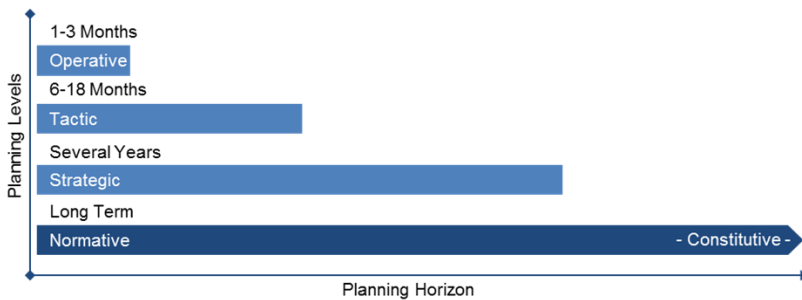


Figure 3: Planning levels and horizons in supply chain management (Bleicher, 2004, p.80).

### Lean management principles

The lean concept was developed in Japan after the Second World War when Japanese manufacturers realized that they could not afford the massive investment required to rebuild facilities. Toyota produced automobiles with less inventory, human effort, investment and defects and introduced a greater variety of products. The goal of lean management is to concentrate efforts in added value and customer demand by reducing waste. Various authors have studied the quantitative and qualitative benefits of lean implementation.

Quantitative are improvement in production lead time, cycle time, set up times, inventories, defects and scrap as well as overall equipment effectiveness. Qualitative benefits include improved employee morale, motivation, better communication, team decision making, etc. The modern concept of lean management is derived from the Toyota Production System (TPS) (Bhamu & Singh Sangwan, 2014, pp.876-877). Shah and Ward (2003) identified 22 lean implementation elements and classified these into four categories: just in time (JIT), total productive maintenance (TPM), total quality management (TQM), and human resource management (HRM) (Shah & Ward, 2013).

At the same time, lean production concepts make the boundaries between the departments disappear. The tasks are distributed between production, maintenance and other departments, which must be taken into account when organizing these fields of responsibility (VDI - Verein Deutscher Ingenieure, 2012, p.2). Therefore to reach all potentials of lean management in production systems the break-down of responsibilities and communication channels should be redefined. As basis for the conceptual model the seven zeros build the basic goals for the production system.

To illustrate the methods of lean management in a current production system, the VW group principles are shown as example. These are the principles to achieve a synchronized production oriented to added value (Bozalongo Santander, 2013, pp.50-55):

- A work organization oriented towards people
- Basics: cycle, flow, pull and perfection
- The customer cycle as a guide
- Process time reduction
- "Pull" principle
- Quality with zero failures
- Standardization
- Leveled and smoothed production
- Environment protection
- Elimination of any waste

#### 4. Basics of organization & production management, lean management principles and the Viable System Model

##### Development of a target system for an organization and for a production system

The final goal of each business activity is to increase the value of the company (Biedermann, 2008, p.88). The orientation to corporate value corresponds to the management approach based on added value. This approach provides the basis for corporate orientation towards increasing corporate value. The increase in the company value will be achieved mainly by

increasing the performance of the company (Alexandre et al., 2004, pp.126-127). The key indicator includes, therefore, the factors of turnover, capital employed and costs (Alexandre et al., 2004, pp.126-127), which are decisive for the success of the company. These factors are included in the Return-on-Capital-Employed (ROCE) indicator. ROCE is a common feature in business practice and describes the return on a company's capital (see formula below) (Isermann, 2008, pp.876-877):

$$\text{ROCE} = \text{EBIT} / (\text{Capital-Employed}) = (\text{Volume of business-Costs}) / (\text{Capital employed})$$

However, in order to increase the ROCE, the intermediate objectives derived from it have to be improved in a certain way. Figure 4 shows the target system designed for this study based on lean principles. To achieve the highest possible value of ROCE, turnover must be as large as possible, while costs and capital employed as small as possible.

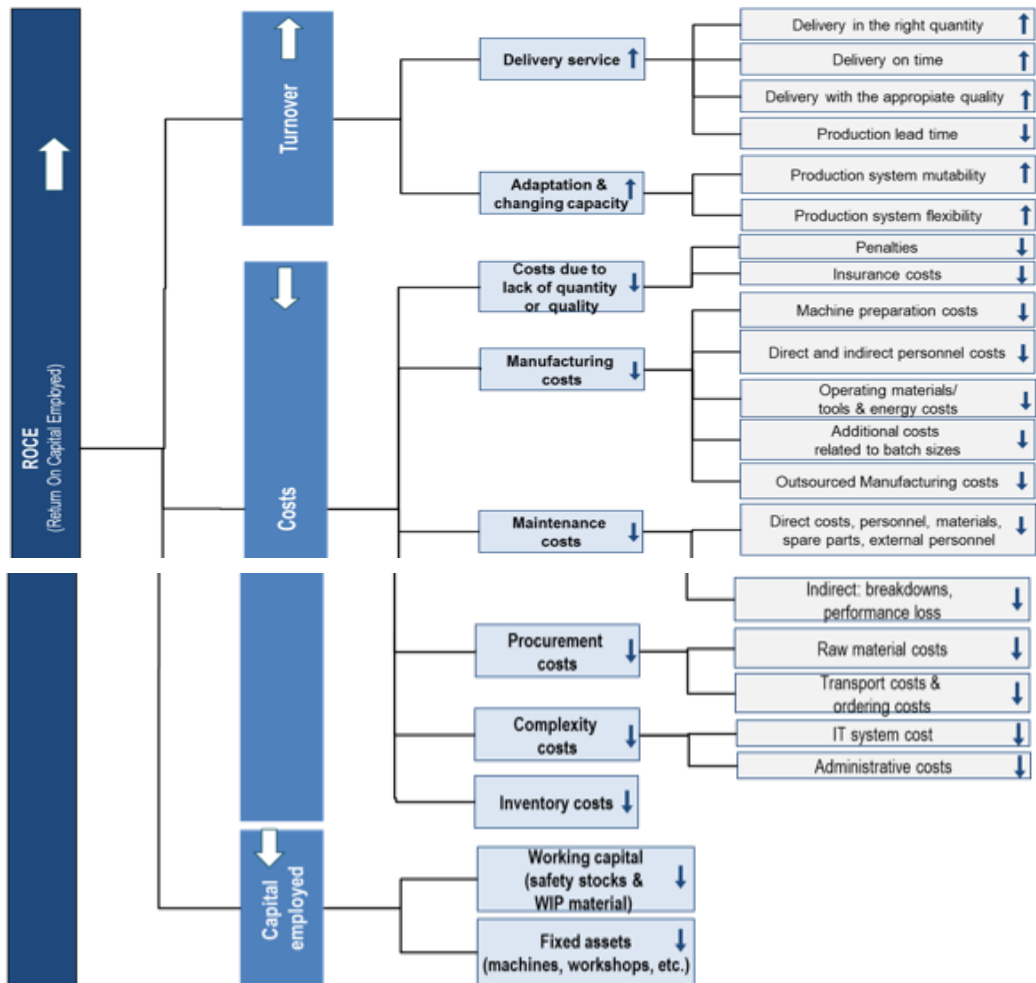


Figure 4: Corporative target system (own elaboration)

### Production management tasks according to planning horizon levels

Production systems are considered important in relation to aspects of quality, time and costs (Dombrowski & Mielke, 2011, p.1). As explained before, planning tasks can be classified into strategic, tactical and operational planning depending on the respective planning horizon. Therefore this classification was performed for the conceptual model:



Figure 5: Production management & planning tasks according to time horizons (own elaboration)

### Definition of recursion levels and operative units

A company is assumed as a viable system that is the first level of recursion in which the five systems necessary to ensure viability are found. Therefore, in the course of this research work can be differentiated four levels of recursion:

The highest level, company (n-1)

The production recursion level (n). In the same recursion level it can be found finance, human resources, IT, research and development, etc.

The recursion level of the plant or production workshop, for example production management activities in an automotive assembly shop (n + 1)

The recursion level of machine group or installation with the associated activities for the different production activities such as preparation of the machine, change of tools, operation, production control, etc. (n + 2)

The systems 1 of the recursion level  $n + 2$  are no longer viable systems in contrast to the higher recursion levels, because they do not contain a structure like that of the VSM, since they are the elements of production execution.

Within this first level of recursion, company, the different functions of a company can be found, such as production, maintenance, commercial, finance, research and development, information systems, etc. In this research project, production tasks will be analyzed in detail, recursion level  $n$ , but also taking into account the function of system 2 at the company level,  $n-1$ , whose function is to coordinate the different functional areas of a company.

System 5 of the company ( $n-1$ ) defines its legal framework, politics, corporate policy and constitution, ethos and underlying values as well as its leadership philosophy. All of this information is transferred to all functional departments inside the organization including the production system. Using these common normative values the company receives information from the environment that can be: the behavior of the competition, data from new markets, new technologies, changes in regulations, influences of globalization or changes in the company's market. Based on these inputs the company defines its strategy in system 4 of company level in continuous communication with system 3 to check if the strategy can be implemented and the internal consequences of its implementation on the stability of the company. System 2 at company level plays the role of coordinator between the functional areas of the company trying to solve conflicts between them. Moreover the systems 1 at company level are all functional areas of every company such as production.

At the recursion level of production ( $n$ ) it is assumed that the different production plants or workshops will be the respective systems 1 which also contains a viable system in each of these locations. The VSM of the production system within a company is described by the tasks performed by its five necessary systems:

System 5 establishes the production objectives and communicates them to the other management systems, systems 3 and 4. System 4 observes and collects essential information from the external environment of the productive system. The environment is mainly represented by the demands of customers, but also by other factors such as information systems offered by the market for the management, planning and control of production, new manufacturing technologies and, in general, all factors affecting the production system such as market standards, delivery times, production strategies, delays, production costs in external companies for example to help in making decisions about outsourcing or to not manufacture certain parts or the assembly of certain sets, etc. With these and other informations from the external environment and information from system 5, system 4 creates a vision of what the production area has to be and which should be the measures to be followed to reach that state. This vision is validated internally with system 3 so that system 4 makes the decision and System 3 makes the changes internally.

System 3 is responsible for maintaining the internal stability of the model by optimizing the use of internal resources using the information received from system 4 about the clients as well as the information of the different divisions of system 1 obtained through system 2. It would be related to functions such as operative production management and control, information management, quality management, operative logistics planning and control, etc. Moreover system 3\* allows a quick response to possible emergencies in the manufacturing process or in the production control and monitoring by acting before information flows through system 2. It is capable to perform actions in real time if something happens outside of normal limits such as making changes in sequencing and production scheduling to avoid stopping production flow.

System 2 is represented by the functions of coordination between the different production locations in daily activities. This system receives all the information of the different production plants and acts as a filter so that only the necessary information reaches the system 3. The difference between both is in the time horizons of action. While system 2 performs functions in daily activities, the tactical system optimizes the performance of the internal system over a longer time horizon.

System 1: each plant or workshop within the production system is an operational unit that includes the management of the unit and the division that performs the operational activities. An example could be an assembly workshop that contains production planning and control departments responsible for the equipment and personnel including team leaders together with the operators that finally perform the production tasks.

Environment: represents all the external factors that influence the production system in a company. The diagram shows the environment of the entire production area as well as of each production plant or workshop.

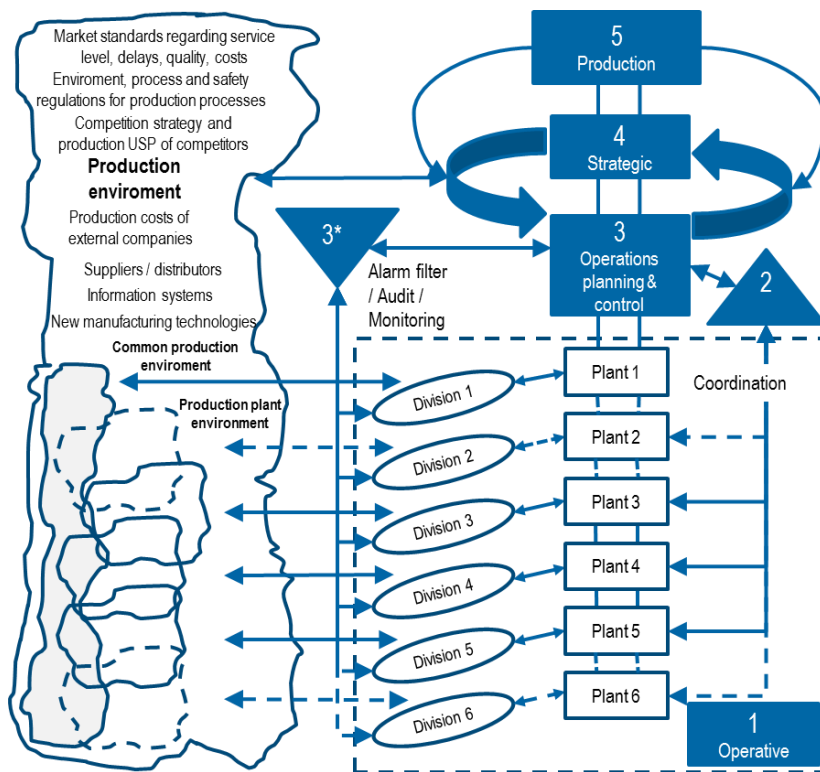


Figure 6: Analogy with the VSM: Production recursion level (own elaboration)

#### Association of tasks to the recursion levels & operative units

Production management tasks were assigned to the VSM systems at recursion levels  $n$  and  $n + 1$ . As an example in **Error! Reference source not found.** are shown the strategic production management tasks and its classification. In the same way it was done for all other tasks:

Strategic planning tasks	Production recursion level			Plant recursion level		
	S 5	S 4	S 3	S 5	S 4	S 3
Principles, guidelines (1.1)	X			X		
Definition of product programm (1.2)	X					
Organizational structure (1.3)		X				
Creation of investment programm (1.4)		X				
Production strategy planning & master data (1.5)		X				
Continuous evaluation of production environment (1.6)		X				
Target system (quality, cost, time) (1.7)		X				
Production system design, production location distribution (1.8)		X				
Production master programm: sales planning, requirements and resources planning (1.9)		X				
"Make-or-buy" decisions (1.10)		X				

Figure 7: Strategic production management tasks and its classification to VSM systems (own elaboration)

### Identification of the needed information flows between operative units and recursion levels

Current technical literature agrees that the connection interfaces between recursion levels is extremely important (Ríos, 2012, p.59). Goal is to determine basic links that can be transferred to any VSM in any company. The intensity of this connection between the levels varies according to the company (Ríos, 2012, p.59). An exchange of information within the company and between levels of recursion is necessary to control the corporate environment, which generally has more information than can be processed in the company (Herold, 1991, p.287). Between the recursion levels it can be found the following communication flows:

Between the company environment and the system 4 at the production recursion level  
 Between systems 5 of company and production  
 Between systems 4 of company and production  
 Between systems 3 of company and production  
 Between systems 2 of company and production  
 Between the operating units, systems 1, of company and production  
 Between the alarm / monitoring filter (System 3\*) of the company's recursion level and system 4 of production

The company environment can not be assigned to a specific recursion level, but is a joint element for the entire structure of the VSM. System 4 collects all the information that allows the company to recognize future developments and possibly reorient its own structures (Malik, 2006, p.456).

Between the two normative systems of company and production there is a flow of information that defines the degree of freedom of decision making in which production recursion level can act. Specifically, it means that the decisions taken by the management of the company are communicated to the management of production management defining its guidelines for autonomous decision making within the respective areas. These guidelines can be financial, on personnel, on affectation to other areas, etc. In the same way, the objective levels such as production in term, production quality and production costs and adaptation capacity are influenced by decisions from the management, defining the priorities and the limits for the coordination among production areas.

An example could be: the direction of the company in its strategic plan establishes the target production volume for the following years as well as the required flexibility in percentage on the production as well as the decrease in target costs. Of course these decisions would influence the decision-making framework for the production system that should adapt their methods and tools to be able to optimize costs, times and quality based on the given flexibility.

As explained during the research work basic communication flows were defined. In total a number of 88 information connections were defined for the production recursion level specifying if the communication goes from company's recursion level to production recursion level or between systems in production recursion level. An extract is shown in

51	Performance of the IT system for production management	From System 3 to 4
52	Processing methods of production orders	From System 3 to 1/2
53	Principles, guidelines and product program	From System 5 to 4/3
54	Decrease production lead times "zero waste" "zero inventory"	From System 5 to 4/3
55	Improvement of customer service level "zero defects" "zero delays"	From System 5 to 4/3
56	Stock minimization: "zero inventory"	From System 5 to 4/3
57	Maximize the assurance of quality in production process "zero defects"	From System 5 to 4/3
58	Minimization of working accidents "zero accidents"	From System 5 to 4/3
59	Minimization of environmental impact & energy resources consumption "zero waste"	From System 5 to 4/3
60	Maximization of orders manufactured according to planning "zero delays"	From System 5 to 4/3
61	Prioritize production orders based on delays to final customer delivery date "zero delays"	From System 5 to 4/3
62	Maximization of the use of facilities and personnel "zero waste"	From System 5 to 4/3
63	Optimization of production costs "zero waste"	From System 5 to 4/3
64	Minimization of deviations between sales forecasts and production needs "zero waste"	From System 5 to 4/3
65	Optimization of production changeovers "zero unplanned changeovers"	From System 5 to 4/4
66	Minimization of production breakdowns "zero breakdowns"	From System 5 to 4/5
67	Customer satisfaction	From System 5 to 4/3
68	Information on principles, guidelines	From company to 4/5
69	Information about company policy	From company to 4/5
70	Information on basic strategies	From company to 4/5

Figure 8:

No.	Information in production recursion level	From ... to ...
28	Number of orders and quantity produced	From System 1 to 4/5
29	Number of orders that have met the required deadlines and quantity	From System 1 to 4/5
30	Average Delivery time of the products	From System 1 to 4/5
31	Number of defective Deliveries	From System 1 to 4/5
32	Number of Deliveries with claims	From System 1 to 4/5
33	Total number of changes made to production schedules	From System 1 to 4/5
34	Average deviation on the quantities produced per week and product	From System 1 to 4/5
35	Information on manufacturing costs as well as administrative costs	From System 1 to 4/5
36	Information about inventory and warehouse costs	From System 1 to 4/5
37	Information on guarantees and sanctions	From System 1 to 4/5
38	Financial situation of the production plants	From System 1 to 4/5
39	Number and size of productive plants	From System 1 to 4/5
40	Information on transport costs	From System 1 to 4/5
41	Information about order processing costs	From System 1 to 4/5
42	Information on the decisions made so far in a production plant (knowledge management)	From System 1 to 4/5
43	Methods of prioritizing production orders according to predefined rules	System 3 to 1/2
44	Methods of redistribution of production employees between production plants	System 3 to 1/2
45	Change the method or percentage of make-to-stock orders to make-to-order / assembly-to-order	System 3 to 1/2
46	Adjust the methods of forecasting the demand according to the demand pattern	System 3 to 1/2
47	Redefine the requirements calculation methods for production capacities	System 3 to 1/2
48	Opening of a new production plant	System 3 to 1/2
49	Supplier selection methods	System 3 to 1/2
50	Production structure and layout planning methods	System 3 to 1/2

51	Performance of the IT system for production management	From System 3 to 4
52	Processing methods of production orders	From System 3 to 1/2
53	Principles, guidelines and product program	From System 5 to 4/3
54	Decrease production lead times "zero waste" "zero inventory"	From System 5 to 4/3
55	Improvement of customer service level "zero defects" "zero delays"	From System 5 to 4/3
56	Stock minimization: "zero inventory"	From System 5 to 4/3
57	Maximize the assurance of quality in production process "zero defects"	From System 5 to 4/3
58	Minimization of working accidents "zero accidents"	From System 5 to 4/3
59	Minimization of environmental impact & energy resources consumption "zero waste"	From System 5 to 4/3
60	Maximization of orders manufactured according to planning "zero delays"	From System 5 to 4/3
61	Prioritize production orders based on delays to final customer delivery date "zero delays"	From System 5 to 4/3
62	Maximization of the use of facilities and personnel "zero waste"	From System 5 to 4/3
63	Optimization of production costs "zero waste"	From System 5 to 4/3
64	Minimization of deviations between sales forecasts and production needs "zero waste"	From System 5 to 4/3
65	Optimization of production changeovers "zero unplanned changeovers"	From System 5 to 4/4
66	Minimization of production breakdowns "zero breakdowns"	From System 5 to 4/5
67	Customer satisfaction	From System 5 to 4/3
68	Information on principles, guidelines	From company to 4/5
69	Information about company policy	From company to 4/5
70	Information on basic strategies	From company to 4/5

Figure 8: Example of information flows in the conceptual model of company and production (own elaboration)

## 5. Conclusions

The research work helped to develop a model supporting the following main hypotheses:

Thanks to a new conceptual model for organizational management and production taking into account the added value to the end-customer within a supply chain, the viability of a company can be assured.

Lean management provides the methods and tools to be applied inside any organization to improve company target system: delivery service, costs and performance.

The Viable System Model provides the necessary structure to determine the interrelationships between areas and parameters that allow them to be optimized in a recursive way, making continuous improvement possible. It enables to create regulatory mechanisms to ensure the viability of the company in the long term.

Next step of the research will be to simulate company and production performance using the conceptual model developed and to compare it with current available structures how to deal with changing environment. Final goal is to transfer this research method to real organizations and production systems applying it in particular areas or to design organizations and production models based on it.

In conclusion this proposed approach can increase the efficiency of organizations and production systems. Also it shows how a VSM approach can be used as a methodology for organizations and production systems to be successful in any kind of environment. By using it a company can adapt itself to all future potential environment scenarios by changing its strategy and internal set-up.

## References

- [1] Abele, E., & Reinhart, G. (2011). Zukunft der Produktion. Hanser München.
- [2] Alexandre, P., Sasse, A., & Weber, K. (2004). Steigerung der Kapitaleffizienz durch Investitions- und Working Capital Management. Controlling, 16(3), 125-132.
- [3] Ashby, W. R., (1957). An Introduction into Cybernetics. William Clowes and sons, London.
- [4] Auerbach, T., Bauhoff, F., Beckers, M., Behnen, D., Brecher, C., Brosze, T., ... & Esser, M. (2011). Selbstoptimierende Produktionssysteme. In Integrative Produktionstechnik für Hochlohnländer (pp. 747-1057). Springer, Berlin, Heidelberg.
- [5] Beer, S., (1959). Cybernetics and Management. John Wiley & Sons, University of Michigan

- 
- [6] Beer, S., (1972). *Brain of the Firm*. Herder and Herder, Great Britain.
  - [7] Bhamu, J., & Singh Sangwan, K. (2014). Lean manufacturing: literature review and research issues. *International Journal of Operations & Production Management*, 34(7), 876-940.
  - [8] Biedermann, H. (2008). *Ersatzteilmanagement: Effiziente ersatzteillistik für industrieunternehmen* Springer-Verlag.
  - [9] Bleicher, K. (2004). *Das konzept integriertes management: Visionen-missionen-programme*. Frankfurt/Main: Campus Verlag.
  - [10] Bozalongo Santander, L. (2013). *Implantación de un plan de producción fijo para el taller de prensas de volkswagen navarra*.
  - [11] Brecher, C., Kozielski, S., & Schapp, L. (2011). Integrative produktionstechnik für hochlohnländer. *Wertschöpfung Und Beschäftigung in Deutschland*, , 47-70.
  - [12] Brosze, T. (2011). *Kybernetisches management wandlungsfähiger produktionssysteme* (Dissertation, RWTH Aachen).
  - [13] Capgemini (2010). Customer back on top of the supply chain agenda in 2010 from financial crisis to recovery: Does the financial crisis still dictate supply chain agendas?
  - [14] Christopher, M. (2005). *Logistics and supply chain management; logistics and supply chain management creating value-added networks*.
  - [15] Christopher, M. (2011). *Logistics & supply chain management* Pearson Education, Harlow.
  - [16] Dombrowski, U., & Mielke, T. (2011). *Ganzheitliche produktionssysteme: Aktueller stand und zukünftige entwicklungen* Springer-Verlag.
  - [17] Edwards, J. N. (1983, November). MRP and kanban—American style. In *APICS 26th conference proceedings* (pp. 586-603).
  - [18] Erbsen, A. (2012). *Krankheit im Zentrum: Gestaltung von krankheitsorientierten Spitalstrukturen aus kybernetisch-konstruktivistischer Sicht*. Springer-Verlag.
  - [19] Espejo, R., & Harnden, R. (Eds.). (1989). *The viable system model: interpretations and applications of Stafford Beer's VSM*. Wiley.
  - [20] Frazelle, E. (2002). *Supply chain strategy: The logistics of supply chain management* McGraw Hill.
  - [21] Friedli, T., & Schuh, G. (2012). *Wettbewerbsfähigkeit der produktion an hochlohnstandorten* Springer-Verlag.
  - [22] Gomez, P. (1978). *Die kybernetische Gestaltung des Operations Managements*. Paul Haupt.
  - [23] Groten, M. (2017). *Integrierte Planung von Distributionsnetzwerken auf Basis des Viable-System-Models*. Apprimus Verlag.
  - [24] Hering, N. S. (2014). *Echtzeitfähig-koordinierte produktionsplanung in supply-chains der verbrauchsgüterindustrie* Apprimus-Verlag.
  - [25] Herold C. (1991). *Ein vorgehenskonzept zur unternehmensstrukturierung heuristische anwendung des modells lebensfähiger systeme*. (Difo Druck: Bamberg).
  - [26] Herrmann, C., Bergmann, L., Halubek, P., & Thiede, S. (2008). Lean production system design from the perspective of the viable system model. In *Manufacturing Systems and Technologies for the New Frontier* (pp. 309-314). Springer, London.
  - [27] Hopp, W. J., & Spearman, M. L. (2008). *Factory Physics*. Vol. 2.
  - [28] Isermann, H. (2008). *Logistik als managementfunktion*. Arnold, D./Isermann, H./Kuhn, A.FI" Empelmeier, H.(Hrsg.): *Handbuch Logistik*, Berlin Ua, S.D1-3 Bis D1-10.
  - [29] Kämpf, R., Gienke, H., & Kämpf, R. (2007). *Grundlagen des Produktionsmanagements*. *Handbuch Produktion: Innovatives Produktionsmanagement: Organisation, Konzepte, Controlling*. Hanser, München.
  - [30] Kompa, S. (2014). *Auftragseinlastung in überlastsituationen in der kundenindividuellen serienfertigung* Apprimus-Verlag.
  - [31] Malik, F. (2006). *Strategie des Managements komplexer Systeme*, Haupt, Bern. Google Scholar.
  - [32] McKinsey. (2011). *McKinsey: McKinsey on supply chain: Select publications*.
  - [33] Nyhuis, P. (2008). *Produktionskennlinien—Grundlagen und anwendungsmöglichkeiten* Springer.
  - [34] Placzek, T. S. (2007). *Optimal shelf availability: Analyse und gestaltung integrativer logistikkonzepte in konsumgüter-supply chains* Springer-Verlag.
  - [35] Porter, M. E. (1985). *Competitive advantage: creating and sustaining superior performance*.

- 
- [36] Ríos, J. M. P. (2012). Design and diagnosis for sustainable organizations: The viable system method Springer Science & Business Media.
  - [37] Santamaría Peraza, R. (2012). La cadena de suministro en el perfil del ingeniero industrial: Una aproximación al estado del arte. Ingeniería Industrial. Actualidad Y Nuevas Tendencias, (8).
  - [38] Schuh, G. (2009). Dem bullwhip in der logistik und finanzwirtschaft trotzdem. , 16. Aachener ERP-Tage. 17.06.2009, Aachen
  - [39] Schuh, G., & Roesgen, R. (2006). Aufgaben. Produktionsplanung und-steuerung (pp. 28-80) Springer.
  - [40] Schuh, G., & Stich, V. (2013). Logistikmanagement. Handbuch Produktion und Management 6. 2., vollst. neu bearb. und erw. Imprint Springer (VDI-Buch, 6). Berlin, Heidelberg.
  - [41] Schuh, G., Brosze, T., Brandenburg, U., Cuber, S., Schenk, M., Quick, J., . . . Hering, N. (2012). Grundlagen der produktionsplanung und-steuerung. Produktionsplanung Und-Steuerung 1, , 9-293.
  - [42] Schuh, G., Stich, V., Brosze, T., Fuchs, S., Pulz, C., Quick, J., ... & Bauhoff, F. (2011). High resolution supply chain management: optimized processes based on self-optimizing control loops and real time data. Production Engineering, 5(4), 433-442.
  - [43] Schulte, C. (2008). Logistik: Wege zur optimierung der supply chain Vahlen.
  - [44] Schürmeyer, M. (2014). Kybernetische produktionsprogrammplanung Apprimus Verlag.
  - [45] Schwaninger, M. (2004). Systemtheorie. erweiterte fassung des beitrags 'systemtheorie' zum handwörterbuch der produktionswirtschaft (3.th ed.) Schäffer-Poeschel.
  - [46] Schwaninger, M. (2008). Intelligent organizations: Powerful models for systemic management Springer Science & Business Media.
  - [47] Schwaninger, M., Ambroz, K., & Rios, J. P. (2004). System dynamics and cybernetics: a necessary synergy.
  - [48] Shah, R. and Ward, P. T. (2003), "Lean manufacturing: context, practice bundles, and performance", Journal of Operations Management, Vol. 21 No. 2, pp. 129-149.
  - [49] Sheikh-Sajadieh, H., Haghsheenas, R., Etezazian, F., & Saberi, M. (2013). The application of 7 Zeroes in improvement of Lean and Agility manufacture. Interdisciplinary journal of contemporary research in business, 5(8), 263-276.
  - [50] Siller, U. (2011). Optimierung globaler distributionsnetzwerke. Grundlagen, Methodik, Praktische Anwendung. Wiesbaden.
  - [51] Strina, G. (2006). Zur Messbarkeit nicht-quantitativer Größen im Rahmen unternehmenskybernetischer Prozesse. Aachen, Techn. Hochsch., Habil.
  - [52] Tu, Y., & Dean, P. (2011). One-of-a-kind production Springer Science & Business Media.
  - [53] VDI - Verein Deutscher Ingenieure. (2012). VDI 2895 organisation der instandhaltung - instandhalten als unternehmensaufgabe. Düsseldorf,
  - [54] Wildemann, H. (2008). Entwicklungspfade der logistik. Das Beste Der Logistik, , 161-172.
  - [55] Wöhrle, T. (2012). Die krise als chance. Logistik Heute, 34(4), 22-23.
  - [56] ZELENKOVIĆ, D. M. (1982). Flexibility—a condition for effective production systems. The International Journal of Production Research, 20(3), 319-337.

## Shifting Paradigm? Long-Term Value Creation as a Normative Principle in a Hostile Takeover: Evidence from the Netherlands

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### Abstract

This article provides additional insight on the effectiveness of long-term value creation as a legally enforceable norm in the corporate governance system and provides a framework to anchor long-term value creation in takeover decisions. Since the 2008 financial crisis, a growing number of voices in the business world, government and academia, have urged Western economies to move towards a long-term sustainable growth agenda. Boards have a vital part to play in the development of responsible companies. Corporate governance should encourage boards to do so. This could be viewed as a reaction to the negative effects of capital markets and the resulting short-termism. One key method to encourage sustainable value creation in companies is by incorporating long-term value creation as an open norm in corporate governance systems. In the case of a hostile takeover, the risk of short-termism is exacerbated. As a guiding principle, long-term value (LTV) creation should prevent hostile takeovers that could harm the success of the company concerned. In this research paper, we argue that the recent shift in Dutch case law and revision of the Corporate Governance Code in the Netherlands may serve as an important catalyst for 'sustainable' takeover decisions. Through ground-breaking judgments by the Dutch Supreme Court and Enterprise Court, *Cancun* and *Akzo Nobel*, LTV has acquired the status of an enforceable norm. We investigated whether this legal norm is empirically substantiated. The research results allow us to make well-grounded statements about the effectiveness of enforcing LTV in future hostile takeover situations.

**Keywords** Long-term value creation, Takeover, Corporate governance, Normative principles, Stakeholder, Shareholder, Entity concept.

### 1. Introduction

Hostile takeovers continue to be at the centre of corporate governance debates. We address the debate with a closer look at the purpose and the interest of the company and how these concepts affect Dutch corporate governance. Moreover, we argue that the concept of company interest in creating long-term value creation, as a legally enforceable norm, might be a promising perspective to overcome the shareholder/stakeholder dichotomy in corporate governance debates. Furthermore, we argue that recognising the characteristics of company interest is an important step in making progress in this discourse.

We will start this paper with reflections drawing from economic literature on capital markets and theory of the firm that have provoked the need to revive the 'company interest' in the corporate governance debate. We argue that capital markets have become increasingly short-term oriented or less patient, which could be detrimental to long-term value creation.<sup>1</sup> This problem is particularly acute in a hostile takeover situation. We have taken the Netherlands as a case study to investigate how well long-term value creation is grounded in the Dutch corporate governance system. We have conducted the case study by, first, systematically reviewing the body of case law produced by Dutch courts from 1971 to 2017. Secondly, we

<sup>1</sup> Graham et al. (2005), Barton, et al. (2016), Serafeim, et al. (2017), Barton (2017). For an opposite view, see Kaplan (2017).

have conducted in-depth interviews with the most prominent decision-makers in takeover conflicts. We coded the important and relevant recurring themes in the case law and the interviews and clustered them. In the paper, we synthesize these themes, showing a more accurate conceptualization of the company, the firm, and the positioning of takeovers in the corporate governance system. We conclude by discussing the relevance of anchoring long-term value creation in corporate governance systems.

#### Economic reflections

Corporate governance systems all share underlying ideas, ideologies and/or theories about the purpose of the company and its stakeholders and how these are related to capital markets. Governance systems can improve the functioning of the capital market, even make the functioning possible, but governance systems can also have the effect of hampering the performance of capital markets. This depends on how we conceptualize the capital markets, the company and the firm.

Capital markets, institutions and intermediaries are essential elements in our modern economic society. Ideally, a properly functioning and developed financial system can contribute to economic growth and prosperity if the flow of capital is efficiently organized and contributes to value increasing activities. There is a strong belief that capital markets contribute to the long-term value creating process of companies and societies. This belief depends heavily on an ideal type characteristic of capital markets: their efficiency. In an efficient capital market, prices fully reflect all relevant information (Fama, 1970: 383-417) and market prices are the best available estimate of the fundamental value of the relevant assets. In the Kay-Review (Kay, 2012: 71) it was recognised that the central focus of regulators has been on fighting specific abuses, reporting misleading information, fraud, conflicts of interest and foreknowledge; these could all be labelled as information asymmetries.<sup>1</sup> The efficient market hypotheses became the ideological underpinning for governance purposes to eliminate these market failures.

One related belief is that the company is considered to be an extension of its shareholders (Fox and Lorsch, 2012). Anonymous shareholders are considered to be perfect and efficient monitors of managers. If a company moves away from shareholder wealth maximization, it will be disciplined by the market, because shareholders will sell the shares of the company. This will decrease the value of the shares, which will make a company more amenable for a (hostile) takeover. The company is thus disciplined beforehand. The concept of shareholder value thus provides timely, relevant and reliable financial information to diminish information asymmetries (Kay, 2012: 71).

If the capital market is efficient 'there is nothing to worry about'. Market efficiency implies that the conflict between short and long term, and between shareholder value and stakeholder value are non-existent. An efficient capital market takes future consequences and future reactions of other stakeholders into account. There are however important developments<sup>2</sup> that undermine the central tenet of the efficient market hypotheses.<sup>3</sup> In general, capital markets have become more international, pluralistic, anonymous and diffuse. Due to an increase in specialization and number of intermediaries, the equity-investment-chain has become larger, and changed from a relation-based to a transaction-based model. Within this chain, agents are frequently monitored with the use of benchmarks.

The capital markets financing function is very low; their main function seems to be offering liquidity to larger multinationals exclusively (Eumedion, 2014). There are serious doubts whether the capital market performs its basic functions as a monitor and valuator and thereby improves long-term value creation. Moreover, would an efficient capital market reflect the underlying fundamental value - the long-term value - of the company and its affiliated firm? This question cannot be easily answered. The essence of long-term value creation is that this value, in principle, is unknown (Pitelis and Teece, 2009: 5-15). Value creation and the sustainability of a firm are the outcome of an uncertain market process – it depends on numerous interacting factors. Paradoxically, if the future value created by the company and its affiliated firm can be determined beforehand, it cannot be created anymore. Everybody then would know the details of its creation, while value

<sup>1</sup> The upswing of the 'shareholder value' movement is usually assigned to Jensen and Meckling (1976), see Fox and Lorsch (2012).

<sup>2</sup> Number of listed companies has declined from 160 (2003) to 97 (2013); relative importance of foreign investors has increased from 37% (1995), 70% (2007) to 76% (2010); pension funds increasingly invest indirectly via intermediaries; this relative amount increases from 39% (2006) to 82% (2012), (Eumedion, 2014). Number of corporate takeover defenses decreased substantially (Bootsma, 2015); Average holding period of shares has decreased due to anonymous computerized trading (Haldane, 2010); Level of concentration of ownership declined from 34.6% to 24.1% during 2006-2016 (de Jong, 2017).

<sup>3</sup> See Haldane (2010) for a lot of anomalies of the EMH.

creation could only occur when the origin - the idea - is kept secret. Amit and Schoemaker (1993) recognize the following characteristics of valuable resources: complementary, scarcity, low tradability, inimitability, limited substitutability, appropriability, durability, and overlap with strategic industry factors. Bowman and Ambrosini (2007: 321-322) conclude that value depends on a complex pattern of interlinked, context-specific factors, and a single resource is unlikely to be isolatable as the sole source of firm performance: "due to the many difficulties resources will resist any attempt at precise valuation."

Accordingly, if we are suspicious of whether the efficient market hypotheses is a suitable, sole or overarching mechanism to open up Pandora's box of a value creating firm, we should also critically reposition takeovers as a value enhancing mechanism and reassess the underlying corporate governance system. We propose that such reassessment should focus on the company and its affiliated firm(s) as a separate entity, moving beyond the classical dichotomy of shareholder and stakeholder orientation.<sup>1</sup>

## 2. Beyond shareholder and stakeholder orientation: the company interest in hostile takeovers

The significance of legal fiction

A firm (or enterprise)<sup>2</sup> is an organized economic activity. Large firms are typically organised using companies which allow them to operate in the legal system and the economy and which structure their economic activities (Robé, 2011: 3).

A company and its affiliated firm can function in the economy as if it is a human being. Of course, it is true that companies are legal fictions. Even so, companies are significant 'fictions' and (the consequences of) their actions – always done or committed by natural persons – are in principle attributed to these fictions by law. Companies protect the illiquid irreversible investments in the firm, to reap the benefits or capture the value created by the firm. By creating liquid markets, individual shareholders can exit on a daily basis and the company can transcend the time horizon of individual shareholders.<sup>3</sup> Moreover, the company can transcend the time horizon of any other stakeholder making a contribution to the firm. The notion that companies are legal persons and are able to structure the economic activities of firms is of tremendous importance for the understanding of their governance.

Company purpose

The first key structuring element is that a company has a purpose. For each legal person under Dutch private law (i.e. the company), the law requires a purpose to be specified. It requires that the deed of incorporation contains the articles of association of the company and that these articles of association contain the purpose of the company.<sup>4</sup> At its core, the purpose of the company is simply to develop certain activities to achieve certain results (Assink, 2015). Many legal systems, adopt an open-ended and value-neutral approach to the purpose of the company. To put it differently, there is no company law rule which requires that the purpose of a company is to direct its activities towards shareholder value maximization for the short or long term.<sup>5</sup> Likewise, companies are under no legal obligation to advance wider, social, environmental, religious and/or public objectives.

Admittedly, the company and its activities can be restricted via specific laws and regulations, for instance, securities law, tax law, labour law, environmental law, telecom law, energy law, and health care law. In those cases, the company must abide by these specific laws. However, to comply with specific laws is clearly distinct from incorporating a purpose wider than profit maximization, such as the care for the environment. In the latter situation, company law allows a company to internalize environmental care (or any other wider orientation) as part of its purpose by anchoring such purpose voluntarily in the articles of association.

Company's interest and the interest of the firm

<sup>1</sup> In the 1930's Berle and Dodd were already debating about the ontological existence of the firm as a separate entity (Robé, 2011).

<sup>2</sup> In this article firms and enterprise are used interchangeably to denote the organized economic activities that may be structured by companies.

<sup>3</sup> The origin of the corporation – to stress the long term perspective – contradicts with the short term pressure of equity markets.

<sup>4</sup> Compare article 2:66/177 of the Dutch Civil Code (DCC) and section 31 of the UK Companies Act, 2006.

<sup>5</sup> For example, article 2:66(1) DCC.

The second key structuring element is that a company has a distinct interest. The notion that a company is a legal person with a definable purpose is accompanied with the acknowledgment that the company could be seen as an actor with its own interest, to be distinguished from those involved in or who have a stake in the company and its activities. The view that company interest could exist, distinct from the interests of the stakeholders of the company, applies best in the situation when a company maintains a firm. In a series of judgments in the takeover context,<sup>1</sup> the Dutch Supreme Court explicitly acknowledged the distinction between the 'company interest' and the interests of 'others involved in the company'. Effectively, as we will demonstrate in section 3, the Supreme Court has consistently rendered its decisions based on the directors' obligation to act in the interest of the company and its affiliated firm (article 2:129/239(5) DCC, as codified in 2013), in conjunction with the standards of reasonableness and fairness to take due care of the interests of those involved in the company (article 2:8 DCC).

The growing body of case law in the Netherlands indicates that – although recognizing the open ended nature of the purposes companies may have – in the typical situation where a firm is connected to a company, the purpose of the company is to promote the interests of the firm.<sup>2</sup> Yet, it was not until the *Cancun* judgment in 2014, that the Dutch Supreme Court explicitly assigned legal significance to the interest of the firm by interpreting the scope of the company's interest: '*if a firm is connected to a company, the company's interest is, as a general rule, mainly determined by promoting the sustainable success of this firm*'.<sup>3</sup> When treating this ruling formalistically, one could argue that the Supreme Court has attempted to define, or even to restrict, the interests of the company (Blanco Fernández, 2012; Raaijmakers, 2014). A closer reading suggests that the Supreme Court may not have intended such a narrow view.

It is more likely that the Supreme Court's decision was intended to formulate a legal norm to rebut the absolute primacy of any single constituency's interests or entitlements, including the director's invested strategy in the firm. This argument may have greater substance, considering our understanding and deployment of the corporate entity and its affiliated firm in daily business and transitional circumstances (Whincop, 2001: p. 48-49). Most companies are established for an indefinite period of time and operate in a changing environment. Not only do the external circumstances change over time forcing the company to make transitions, those involved in the company – the stakeholders – change too, sometimes within a split second.

That is not to deny that the ruling of the Supreme Court is without any effect. On the contrary. After *Cancun*, the amended Dutch Corporate Governance Code 2016 (DCGC 2016) acknowledged that the purpose of the company was '*to create long-term value*'.<sup>4</sup> It is important to note here that before the amendments to the Code, from 2003 onwards, the view of the Corporate Governance Monitoring Committee was that '*a company endeavours to create long-term **shareholder** value [emphasize added]*'.<sup>5</sup> Moreover, in the recent high profile takeover contest between Akzo Nobel and PPG, the Dutch Enterprise Court applied the *Cancun* formula and decided that company boards are obliged to direct their actions towards '*the long-term value creation of the company and its affiliated firm*'.<sup>6</sup>

Without negating the significance of the above-mentioned rulings and developments in the Netherlands, one could argue that in effect 'the Dutch' are now merely 'in sync' with the 'neighbouring Europeans'. Germany, Sweden, Norway, Denmark, Austria and Belgium, have long emphasised the company's sustainable value creation.<sup>7</sup> The orientation of the company towards sustainable value creation is not difficult to justify given the increased importance of the social embedment of companies, in particular those companies maintaining large firms, operating across the world. The company's license to operate might well depend on the extent to which the company and its connecting firm(s) succeed in creating value, globally and locally (de Jongh, 2011: 3). The legal translation could be argued as follows: that the company's interest to create

<sup>1</sup> See section 4 of this paper.

<sup>2</sup> See section 4 of this paper.

<sup>3</sup> Dutch Supreme Court, 2014 NJ 2014/286 (*Cancun*), paragraph 4.2.1. We will be introducing our own translations of the Dutch court judgments.

<sup>4</sup> See the preamble of de DCGC 2016 and article 1.1.1 (strategy for long-term value creation) of the Code.

<sup>5</sup> See the preamble of the DCGC 2003, under paragraph 3.

<sup>6</sup> Dutch Enterprise Court 29 May 2017 ECLI:NL:GHAMS:2017:1965, paragraph 3.34 (Akzo/Nobel), JOR 2017/261 with annotation from C.D.J. Bulten.

<sup>7</sup> See the Corporate Governance Codes of these countries, article 4.1.1 (CGC 2017 Germany), article 3.1 (CGC 2016 Sweden), pages 32 and 48 (CGC 2014 Norway), art. 4 (Denmark 2017) preamble, article 26a (Austria 2018), preamble under paragraph 2, article 1.1 (Belgium 2009).

value is regarded as a legal norm which is addressed to the company, to the constituents of the company such as the board of directors, the supervisory board and the general meeting of shareholders, and any other stakeholder involved in the company and its affiliated firm. Accordingly, acknowledging the company's interest as a legally enforceable norm is not without consequence, nor does it leave the corporate governance debate unaffected. Three major principles should be contemplated to overcome the shareholder/stakeholder dichotomy and to make progress in the corporate governance debate:

The interest of the company in the sustainable success of its affiliated firm transcends any stakeholder and shareholder interests;

Executive directors, under the supervision of supervisory directors, have an obligation towards the company to make business decisions (including strategic decisions) to further pursue the sustainable success of the interest of the company and its affiliated firm<sup>1</sup> and when making these business decisions have an obligation towards the company's stakeholders, including shareholders, to take due care and not cause unnecessary or disproportionate harm;<sup>2</sup>

The company's shareholders, when acting collectively in the general shareholders meeting in the pursuit of their (collective) interests, are bound via the standards of reasonableness and fairness, to not disproportionately harm the company's interest, under the penalty of deterioration of the shareholders' resolution. A situation where individual shareholders are confronted with a bid and are incentivized to put their private interests first, may legitimately face frustration of the bid by the target board.

We investigated the robustness of these principles in a hostile takeover situation. We reviewed the case law from 1971 to 2017 with the aim of testing how well rooted these principles are in the Dutch legal framework in situations where target boards resisted an uninvited proposal from a bidder to take over the target company and/or situations where target boards have withstood shareholder activism to overrule board strategies or to force the replacement of incumbent board members (section 3).<sup>3</sup> In addition, we reflected on the results of the case law analysis by conducting eight interviews with participants who hold positions which can be regarded as highly influential in shaping Dutch corporate governance (section 4).

### 3. Results of the case law analysis 1971-2017

#### Takeovers and the right of inquiry

A few preliminary remarks on the structure and legal context of the case law analysis should be made to allow better insight into the results of the research. Takeover conflicts are mainly (not exclusively) reviewed through an inquiry procedure before the Enterprise Court, by submitting a request for an investigation into the policy and affairs of the legal person (article 2:350 DCC) under the review of the Supreme Court. The legal person – the company – is thus the object of review. Unlike the civil procedure, the inquiry procedure is not aimed at settling disputes of a pecuniary nature, but foremost to re-establish healthy relations within the company. Given the particularity of the inquiry procedure, the Enterprise Court may review the actions of company boards and of the company shareholders. We investigated whether in a hostile takeover situation long-term value creation was a determining factor for the courts<sup>4</sup> to review and decide the takeover conflict. More specifically, we focused on finding the conditions and circumstances an anti-takeover defensive measure (ATD) taken by the company, by means of its target board, was allowed, or in legal terms, was justified.<sup>5</sup> If an ATD was not justified, it might be an indication that mismanagement has taken place and that there are well-founded reasons to doubt that the company's policy or state of affairs was in order. In the cases under study, the judicial review was mainly focused on assessing the obligations of the company and its board in taken the decision to implement an ATD and whether this decision was justified. At the same time, we extrapolated our analysis to assess the duties of other stakeholders, namely those of the shareholders in a takeover situation.

Reasonableness and fairness as the dominant standard of review of target boards' decisions – 1971

<sup>1</sup> Accordingly, exercising their legal task (article 2:129/239 DCC).

<sup>2</sup> Accordingly, to abide by the standards of reasonableness and fairness (art. 2:8 DCC).

<sup>3</sup> The case law analysis ended on 1 December 2017.

<sup>4</sup> Referring to the Enterprise Court and/or the Supreme Court.

<sup>5</sup> Rb. Haarlem, 12 June 1990 ECLI:NL:RBHAA:1990:AC2566 (Asko/Ahold).

In the earliest cases, courts reviewed anti-takeover defensive measures on the basis of reasonableness and fairness, without explicit mention of sustainability or long-term value creation.<sup>1</sup> The starting point in early rulings has been that an ATD is justified if a company could 'reasonably expect a possible threat to its continuity and own identity'.<sup>2</sup> This line of reasoning has been reaffirmed in later judgments.<sup>3</sup>

In *Immofarm*, the 'continuity of the company' and 'the autonomous existence of the company', 'the preservation of its own Dutch character and its staff' were reasoned as part of the duties of the executive and supervisory board towards the company. These company interests were in the realm of director duties, acknowledged as legitimate interests that could justify ATDs.<sup>4</sup> As the legitimacy of ATDs could depend on whether the continuity or identity of the company may be harmed, a target board's decision to establish an ATD under such conditions was regarded as not being contrary to what the standards of reasonableness and fairness dictate and therefore was not unlawful.<sup>5</sup> Accordingly, the legal norm of reasonableness and fairness is first addressed to the company – without aforementioned justification, the acts of the company are contrary with 'reasonableness and fairness' – and second to the target board, whose obligation towards the company requires the target board to take defensive measures. Reasonableness and fairness thus delineates the leeway for target boards to take ATDs.

Company interest as a safe harbour for target boards – 1993

In the *GTI Holding* case, the GTI board issued shares to defeat a change of control. The ATD was justified, not only because the 'autonomous existence of the company and independence of the company' was under threat, but also because of concern for the 'wellbeing of the company'.<sup>6</sup> The dispute involved a minority shareholder of a competing company who secretly enlarged his shareholding to 32%, after the GTI board rejected his proposal to cooperate. In the *GTI Holding* judgment, the threat to the autonomous existence and independence of the company was objectively assessed as follows:

The acquirer or bidder has given evidence of hostile intentions with regard to gaining control e.g. against the wish of the board and supervisory board of the target company;

And the actions of the hostile party are a threat to the autonomous existence of the company and the independence of the company. The mere statement that the secretive acquisition of a larger shareholding was not done with bad intentions, does not take away that the company could perceive it as a threat.<sup>7</sup>

If these conditions are not met, the use of a target board's competence to establish an ATD are contrary to reasonableness and fairness, exposing the decision to annulment (article 2:15 DCC). In other words, a (threat to) the interest of the company serves as a safe harbour for target boards to take ATDs within the boundaries of reasonableness and fairness.<sup>8</sup> This safe harbour argument can also be inferred from the *Heineken Holding N.V.* decision,<sup>9</sup> which was rendered eight years after *GTI Holding*. Heineken explicitly defined the purpose of the company's interest to ensure the continuity of its group in the company's articles of association. Interestingly, the court ruled that when the main goal of a company is to ensure continuity, and this purpose is well known to the shareholders of the company, the shareholders cannot demand that the company will take extreme measures, such as the repurchase of its own shares, that would diminish its influence or even prompt its own liquidation, to increase shareholder value.<sup>10</sup>

The influence of the company's statutory structure on the interests of the company's stakeholders - 2003

In the landmark case *RNA*, rendered in 2003, the Supreme Court further specified conditions for protecting the company interest. The (use of an) ATD must be temporary, so long as it is not found that the company interest is disproportionately

<sup>1</sup> Hof Amsterdam 1 April 1971, ECLI:NL:GHAMS:1971:AB6704 (*Immofarm AG/NV Handelsvereniging v/h Reiss en Co ea*); Rb. Haarlem, 12 June 1990 ECLI:NL:RBHAA:1990:AC2566 (*Asko/Ahold*).

<sup>2</sup> Rb. Haarlem, 12 June 1990 ECLI:NL:RBHAA:1990:AC2566 (*Asko/Ahold*).

<sup>3</sup> 23 January 2009, JOR 2009 / 69 (*Beheermaatschappij Trial*).

<sup>4</sup> Hof Amsterdam (OK) 1 April 1971, ECLI:NL:GHAMS:1971:AB6704 (*Immofarm AG/NV Handelsvereniging v/h Reiss en Co ea*).

<sup>5</sup> Rb. Haarlem, 12 June 1990 ECLI:NL:RBHAA:1990:AC2566 (*Asko/Ahold*).

<sup>6</sup> Rb Utrecht 15 September 1993 ECLI:NL:RBUTR:1993:AC4321 (*GTI Holding*).

<sup>7</sup> Rb Utrecht 15 September 1993 ECLI:NL:RBUTR:1993:AC4321 (*GTI Holding*), see consideration 5.8.

<sup>8</sup> Rb Utrecht 15 September 1993 ECLI:NL:RBUTR:1993:AC4321 (*GTI Holding*), see consideration 5.9.

<sup>9</sup> Hof Amsterdam (OK), 18 October 2001, ECLI:NL:GHAMS:2001:AD4646, NJ 2001, 641 (*Heineken Holding NV*).

<sup>10</sup> Hof Amsterdam (OK), 18 October 2001, ECLI:NL:GHAMS:2001:AD4646, NJ 2001, 641 (*Heineken Holding NV*).

harmful. Here, proportionality is understood as not going any further than required regarding the object of protection.<sup>1</sup> Accordingly, the company's structure may be a relevant factor in determining the legitimacy of a target board's defensive measure, taking into account the position of (minority) shareholders.

The investment company, RNA, was confronted with cooperation plans from minority shareholder, Westfield, who exploited competing activities.<sup>2</sup> Westfield wished for a special shareholders' meeting to discuss his plans, but RNA did not want to discuss Westfield's plans and set up a 'Stichting Belangenbehartiging Beleggers RNA' (SBBR) as an ATD.<sup>3</sup> The Enterprise Court ruled that the fact that a minority shareholder can exercise a decisive influence due to an open statutory structure is in itself an insufficient justification for establishing an ATD and even more so when considering:

that the minority shareholder is an expert in the same sector as the legal person,

that this shareholder has the support of another important minority shareholder,<sup>4</sup>

that the legal person in question is an investment company with variable capital with the sole purpose of investing and spreading risk, so that other interests than that of the shareholders carry less weight.

The RNA case underlines the importance of the statutory structure and purpose of the company when deciding what the legitimate interests of the company and other stakeholders are. Accordingly, the legal structure of the company may raise reasonable expectations. However, despite the open structure of a company, a target board's decision to establish an ATD could nonetheless be justified based on the norms of reasonableness and fairness.

Going from stakeholder value to long-term value creation of the company – 2007- 2017

In the *Stork* decision, in 2007, it was for the first time ruled that company boards are obliged to take into account the interests of all stakeholders.<sup>5</sup> More specifically, the Enterprise Court judged that Stork's board had legitimately taken the interests of all stakeholders into account, and not solely of shareholders, when it established the ATD.<sup>6</sup> In this particular case, the relationship between the company's board and its shareholders, Centaurus and Paulson, both hedge funds, was distorted. Since the board has a primary responsibility for determining the company's strategy and had wide support for its successful strategy from important stakeholders, the Enterprise Court deemed the board's strategy to be sound. Accordingly, Stork was not obligated or could not be forced to abandon its stand-alone strategy and opt for the plans of Centaurus, which would involve high risks for all stakeholders.<sup>7</sup>

A few months later, finally, in the *ABN AMRO* case, the Supreme Court, recognised that the company's interest and its affiliated firm's interest as being a distinct interest from those of the company's stakeholders.<sup>8</sup> But it was not until 2014, in *Cancun*, that the Supreme Court rendered its progressive decision. The Court first clarified what the company's interest may encompass if there was a firm connected to the company, which is '*to promote the sustainable success of the company*'. Second, that the company interest is a separate, distinct interest from the interest of the company's stakeholders. And third, that a company board, first and foremost owes its duty to the company to promote the interest of the company and its affiliated firm. While discharging this legal obligation, the board has to take into account the interests of the company stakeholders according to the requirements of reasonableness and fairness.

Three years later, *Cancun* was put to an ultimate test. In the *Akzo Nobel* decision, the Enterprise Court reinforced *Cancun* and gave legal effect to the revised Corporate Governance Code. The memorable ruling is as follows: '*in the face of*

<sup>1</sup> Compare Hof Amsterdam (OK) 5 August 2005, JOR 2005/241 (VIBA).

<sup>2</sup> Hof Amsterdam (OK), 16 October 2001 (ECLI:NL:GHAMS:2001:AD4598), NJ 2001, 640 (Westfield Limited ACN/Rodamco North America NV).

<sup>3</sup> Hof Amsterdam (OK), 16 October 2001, ECLI:NL:GHAMS:2001:AD4598), NJ 2001, 640 (Westfield Limited ACN /Rodamco North America NV), see point 3.7.

<sup>4</sup> Hof Amsterdam (OK), 16 October 2001, ECLI:NL:GHAMS:2001:AD4598), NJ 2001, 640 (Westfield Limited ACN /Rodamco North America NV), see point 3.13.

<sup>5</sup> Hof Amsterdam (OK), 17 January 2007, ECLI:NL:GHAMS:2007:AZ6440 (Stork), 3.16-3.17.

<sup>6</sup> Hof Amsterdam (OK), 17 January 2007, ECLI:NL:GHAMS:2007:AZ6440 (Stork), 3.16-3.17.

<sup>7</sup> Hof Amsterdam (OK) 17 January 2007, ECLI:NL:GHAMS:2007:AZ6440, (Stork), see consideration 3.16-3.17 and HR 13 July 2007, ECLI:NL:HR:2007:BA7972; NJ 2007, 434 (ABN AMRO), ECLI:NL:PHR:2007:BA7972.

<sup>8</sup> HR 14 July 2007, ECLI:NL:HR:2007:BA7972, (ABN AMRO) 3.14.

*propositions of a potential bidder, the board of the company has to focus on – in the terms of the Corporate Governance Code – the long term value creation of the company and its connecting firm and to weigh the interests of all relevant stakeholders.<sup>1</sup>*

One could argue that the importance of the company's interest and its firm has gained importance, even legal significance; and as was shown in *Akzo Nobel*, the capability of being legally enforced. The evolution in case law in takeover conflicts shows very clearly the distinct characteristics of Dutch Corporate Governance. The prevalence of the company's interest demonstrates that it is inaccurate to continue to narrow the corporate governance debate to a shareholder/stakeholder dichotomy. Persisting in such conventional thinking is denying the fundamental revolution in company law, which to a greater or lesser extent, is already manifest worldwide (Timmerman, 2014).<sup>2</sup>

#### 4. Results of the interviews

##### In-depth interviews

This section contains the results of eight interviews. We asked participants to reflect on some major takeover conflicts, international developments in corporate governance, recent court decisions and the adoption of long-term value creation of the company and its connecting firm in the Dutch corporate governance system. Among the participants were some key executive and supervisory directors, judges from the Dutch Supreme Court and the Enterprise Court, an Advocate General, a member of the Corporate Governance Monitoring Committee and institutional investors. The interviews were conducted in spring 2018 and lasted about an hour to an hour and a half. The interviews were in-depth interviews to allow the participants to speak freely about a number of themes based on their roles, experiences and preferences. All interviews have been tape-recorded and transcribed. Interviewees have been promised anonymity. The next sections contain ideas and opinions of the participants clustered by different themes followed by a section in which we reflect on the main trade-offs that can be derived from these themes.

When the legal and the social discourse on corporate governance coincide

Judges are not and do not proclaim to be a policy-making body. They prefer to refrain from entering into discussions about company interest, long-term value, sustainability, stakeholder or shareholder value – issues that the legislator should resolve. In addition, judges do not take a position on the company's policy – that is the prerogative of the company director, nor are judges inclined to scrutinize business decisions. Judges are bound by marginal judicial review on the basis of open norms. Both mechanisms are in place to respect the director's discretionary decision making power. The participants from the judiciary clearly stress that 'judges mainly follow, they do not form'. This statement should be viewed critically. In section 3, we have demonstrated that it is the cornerstone in Dutch company law, that company directors discharge their obligations in the interest of the company and its connecting firm. Company interest involves an open norm. Not only does the open norm allow directors discretion, it also allows judges discretion to properly apply the norm to a specific case at hand. Participants have argued that judges have simply applied and interpreted the open norm in *Cancun* and *Akzo Nobel* as was required within the boundaries of Dutch law:

*"I think we can safely say that in the Netherlands, the stakeholder approach is prevalent. This affects the standard of company interest. There is some latitude when you explain the standard and I think that the social debate then plays a role..."*

*Of course we have room to maneuver, but it is all within the limits of the law and when there is openness, you take account of the social debate. I myself think that if a Supreme Court says that the company interest is focused on the firm's success, it is not a view of the judge himself. It is something that the judge thinks: "Well, this seems now widely supported. It is the basis of Dutch law. We can safely say: The company's sustainable success".*" (participant 2).

Indeed, for a judge, the assessment of the process is part of judicial review not the assessment of the content of a business decision. Judges examine which rules have been followed, which participants are involved in the process and whose interests have been considered. The company interest is used by the courts as a key to justify the choices made in the

<sup>1</sup> See also Hof Amsterdam (OK), 29 May 2017, ECLI:NL:GHAMS:2017:1965 (*AkzoNobel*), see consideration 3.12.

<sup>2</sup> Also in Anglo-American traditions, see Orts (2013: 109-131 and 175-222).

process, as company interest is recorded in the law. Only if the board of directors exceeds the limits of company interest, the judge will retain company interest as the standard. In this case, the norm is addressed to the judge.

### Company interest

Although it is the task of a board of directors to determine the company interest, we asked participants to reflect on factors that may be tested to determine whether the company's policy is in line with the company interest.

Several factors have been mentioned that may determine the company interest, including: the nature of the company (e.g. national security or national importance), principles laid down in the articles of association, and a clear picture of the company's stakeholders as well as their interests and the consequences of the takeover. Occurrences such as hostile takeover attempts may not cause disproportionate damage to the company interest. It could even be a safe line. Therefore, the target board must form a clear picture of what the consequences of the acquisition are for the company and its connecting firm, thereby taking into account employment opportunities, competition law, and synergies. Particularly in a calm period, each board should clearly formulate what the company interest involves, and which interests and policies are part of the company's interest, for instance the environmental and/or social policies. A clear formulation of the company interest by the board of directors could guarantee a credible story with any stakeholder of the company including shareholders in case of a hostile takeover attempt, and with the judge in case of a takeover conflict. As one of the participants puts it: *"As a business, you have to be able to anticipate in stead of thinking in terms of anti-takeover measures. We have passed that time, it is not sustainable."* (participant 5).

This statement is in line with the explanation of executive and supervisory directors. The participants indicated that during a hostile takeover, the board went through a list of conditions that had to meet the company interest. The list consisted, among others, a fair price, the interests of the company's stakeholders, and, where applicable, the national security and whether the bidder could be considered a bona fide bidder.

Although none of the participants could deny that shareholders have a strong position in an open public limited company, the majority of the participants agreed that a considered strategy which is plausible, defensible, up-to-date, adequately communicated and made transparent – showing the trade-offs – gives CEO's leeway to determine a long-term route to create long-term value by which it can sustain the business. The best protection of a company is not determined by sophisticated anti-takeover measures, but a sound and clear business policy and strategy that creates long-term value.

### Long-term value creation

The corporate governance code was also brought to the attention to the participants. In particular, the fact that it states that the company must strive for long-term value creation, so that the interests of the company and its connecting firm are served.

A takeover can be the best option for the company and its connecting firm, especially in cases where a lot of investments for long-term stand-alone survival are needed and financing is doubtful. In taking a position in the takeover battle, the level of supposed added value is not the critical element, but how this added value is created. The central consideration is if the interests of stakeholders are not disproportionately harmed.

The general opinion was that concepts such as success of the firm, continuity of the firm and long-term value creation overlap. The meaning of long-term value was interpreted differently by the participants. Company boards tend to interpret long-term value creation as striking the right balance in the actions of the board of directors for the different stakeholders of the company.

Investors tend to view long-term value as more comprehensive than company interest. It also consists of Environmental, Social & Governance (ESG) criteria of a company and other non-financial values. One of the participants also argued that ESG should be more clearly expressed in the long-term strategy of the company.

The present attitude, perceptions and discussion about shareholder-, stakeholder and/or long-term value is a response to the fear of the short-sighted pressure of the capital markets, and in special cases e.g. the ABN-Amro traumatic battle, which tore the company into three pieces and was severely detrimental to the national interest. Due to these forces, firms cannot or can to a lesser extent, implement sound business policies. One of the participants from the judiciary described this as a *"sad state of affairs"*. Judges however cannot disclose all considerations in legal decisions. The legal attitude seems to

be: *"we are not going to co-operate with a hostile takeover, unless"*, which is only marginally reviewed. Judges seem also fear the consequences of their verdict because it can open the door to an uncontrollable process, which can be - due to capital market dynamics - irreversible. It seems that judges are inclined to slow down the process, so that a more balanced judgment can be made concerning trade-offs. The hostile takeover process is influenced by a lot of lobbying, by lawyers, banks, activist shareholders, and the company itself, according to participant 8.

Being a member of the Monitoring Committee, participant 7 stresses the importance of long-term value creation as an enforceable norm, particularly in the face of a hostile takeover. Hostile takeovers typically involve the absence of dialogue between target and bidder and due diligence. Incumbent boards will tend to resist access to due diligence when faced with an uninvited bid. The participant therefore asks boards to critically reflect on the question whether a hostile takeover is an appropriate instrument to create value for the business at all. Without dialogue and due diligence a bidder company could be exposed to excessive risks which may not be in the long-term interest of the bidder company.

#### Broad support and critical voices

The participants seem to support the importance of the adoption of long-term value creation as a norm. It is interesting to observe that investors express their broad support. As one of the participants remarks, shareholders seem to attach more value to long-term value creation than before. For instance, ESG criteria of a company are becoming more important in investment decisions of investors/shareholders. However, the participant stressed that the accountability of boards of directors and their companies on non-financial values can be further improved: *"Investors want to be better informed and convinced about the long-term strategy. Not all boards of directors are sufficiently sharp and responsive. There are few good examples such as DSM, Philips, AMSL. They are at the forefront and therefore are able to avoid threats of activism."* (participant 6).

Yet, there are also critical voices about long-term value creation as a norm. There is a risk that such an open norm would end up to be a panacea. Participant 6 argued that in a public bid situation, the shareholder should be in the driver's seat, not the board. According to the participant, long-term value creation should not play a role in a public bid situation. The participant argued that in the event of a takeover bid, there cannot be any going concern conception of the target company. The shareholders will base their decision to sell their shares on the price that is offered in a public bid situation. Therefore, the price offered should be the guideline for a target board. *"Everything is accounted for in the price."* Moreover, the participant believed that other factors, such as ESG indicators, are also included in the price mechanism.

The above view contrasts significantly with the view of judges. The company interest may differ from the interest of the shareholders to receive the highest price possible. Under Dutch law, target boards may lawfully decide against the shareholders' interests. As one of the participants stressed, if a firm is connected to a company, that company and its board are obliged to promote the long-term value of the company and its firm. It seems indeed that, at least from a legal perspective, long-term value creation has become a legally enforceable norm in a takeover situation. *"That is what the court ruled"*. (participant 1).

#### Reflection

The communis opinio was that open norms have been gradually introduced to the Dutch hostile takeover market. Company and firm interest, long-term value creation, lasting success, sustainability and continuity have been established and consolidated as open norms in the Netherlands. Shareholder value – a hard one-dimensional norm – has been suppressed by long-term value creation – a soft multi-dimensional norm. Some participants suggested that this is a reaction to recent hostile takeovers that had sizable negative repercussions on the Dutch economy (for instance the ABN AMRO trauma). Others also connected this movement to the purported short-term pressure of capital markets. This was the standard reasoning in the past, when the norm – shareholder value maximisation – was based on principles of corporate finance and characteristics of capital markets. Institutional investors, however, still see a more important role for the capital market, even if it is conceded that open norms are now a fact of life. They should act in the interest of their constituents; and they have something to explain when they do not go for the highest bid.

Open norms are only limitedly enforceable. Executive directors are, in large part, autonomous in choosing a strategy. So, in principle, executive directors have the benefit of the doubt. Judges only marginally review a hostile takeover. The executive director is, in principle, the best equipped person to make such a decision. However, not every strategy is plausible, sustainable or feasible in the context of long-term value creation. An up-to-date strategy containing trade-offs

may protect a company against hostile takeover attempts and provide executives room for action. This protection is not unlimited, because the strategy and the reaction to the offer have to be convincing. Company interest should not be confused with strategy. But judges sometimes feel that they have to pronounce a verdict. They fear the unknown consequences of a hostile takeover; there are high risks involved when a company changes their market/product portfolio. But of course not changing means that there are no risks. This also depends on the guarantees offered by the bidding company. Even when a stand-alone choice is not always the best option, judges may fear that an early opening of the door of negotiations sets an irreversible process in motion and careful consideration of the offer is no longer possible.

## 5. Conclusion

An important conclusion is that the dominant Anglo-American agency theory is not easily applicable in Dutch corporate governance. Agency theory assumes that the interests of the agents (directors and supervisory directors) do not always run parallel to those of the principals. Agents should not be trusted because they are continually tempted to make decisions in their own interest over those of the principal. There are alternative views on how we assume people behave however, for instance as one of the participants from the judiciary concisely commented: *"I strongly believe in the mechanism of trust. I would rather be cheated now and then, instead of wanting to check everything. I also know that some people say 'trust is good, control is better'."* The differences in the concept of mankind may have major consequences for the way corporate governance is structured and rationalised. In Anglo-American traditions, the communis opinio is that the shareholders are the ultimate principals. This stands in stark contrast with the Dutch pluralistic view. The company is the principal, so that directors and supervisory directors must direct their actions to further the company's interests. Recognising that shareholders' interests and company interests may differ has the implication that disciplining the management by shareholders does not necessarily serve the interests of the company. This observation does not undermine or diminish the need to discipline executive and supervisory directors. It does however create more complex questions about what solutions are most appropriate. The 'Dutch' seem to no longer look at shareholder value, or the bid price in takeover situations, in isolation as it is simply a one-dimensional inaccurate measure of the value of the firm. Moreover, the belief in the efficiency of capital markets has been kept in check. The 'Dutch' have long learned from the 'ABN AMRO traum', that the pursuit of shareholder wealth could significantly harm the company's interests and society at large.

It seems that, as a consequence of the long-term value creation norm, a new conceptualisation of the company and the affiliated firm has emerged next to the shareholder and stakeholder view, as a reaction to less patient capital markets: the company as a real entity. As a result an alternative principal-agent model arises: the principal (company) and the agent (the board of directors). Long-term value creation changes the attachment of legal scholarship and business studies, and press both disciplines to (re)examine and (re)establish the company interest in the corporate governance debate.

## Literature

- [1] Assink, B.F. (2015). Belang van de vennootschap, overname en algemeen belang. *WPNR* 31 January 2015/7048.
- [2] Barton, D. (2011). Capitalism for the long term. *Harvard Business Review*, <https://hbr.org/2011/03/capitalism-for-the-long-term>
- [3] Barton, D., Bailey, J., and Zoffer, J. (2016). Rising to the challenge of short-termism. *Focusing Capital on the Long Run (FCLT)*.
- [4] Blanco Fernández, J.M. (2018). Wat is de vennootschap en wat behoort het vennootschapsrecht te zijn. *Ondernemingsrecht* 2018/29.
- [5] Bowman, C., Ambrosini, V. (2003). What does value mean and how is it created, maintained and destroyed? Paper presented at the Academy of Management Meeting, Seattle.
- [6] Eumedion, (2014). Corporate governance forum, Position paper, The future of the public equity market from the perspective of Dutch institutional investors.
- [7] Fama, E.F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance*, Vol. 25, No. 2. pp. 383-417.
- [8] Fox, J., and Lorsch, J.W. (2012). What good are shareholders? *Harvard Business Review*. <https://hbr.org/2012/07/what-good-are-shareholders>
- [9] Graham, J.R., Harvey, C.R., and Rajgopal, S. (2005). The economic implications of corporate financial reporting. *Journal of Accounting and Economics*. Vol. 40. pp. 3-73.
- [10] Haldane, A. (2010). Patience and finance, Speech at the Oxford China Business Forum, Beijing, 9 September.

- 
- [11] Jensen, C., and Meckling, W. (1976). Theory of the Firm: Managerial Behavior, Agency Costs, and Capital Structure. *Journal of Financial Economics*, 3(4) pp. 305-360.
- [12] Jong de, A. et al. (2017). Large Shareholders in Corporate Governance. Research for the Monitoring Committee Corporate Governance on the role of large shareholders in corporate governance in the Netherlands commissioned by the Ministry of Economic Affairs. RSM, Erasmus University Rotterdam.
- [13] Jongh, de, J.M. (2011). 'Redelijkheid en billijkheid en het evenredigheidsbeginsel, in het bijzonder in de verhouding aan aandeelhouders tot het bestuur', *Ondernemingsrecht* 2011/124).
- [14] Kaplan, S.N. (2017). Are U.S. Companies too short-term oriented? Some thoughts. NBER
- [15] Kay, J. (2012). The Kay review of UK equity markets and long-term decision making.
- [16] Orts, E.W. (2013). *Business Persons, a Legal Theory of the Firm*.
- [17] Pitelis, C.N., and Teece, D.J. (2009). The (new) nature and essence of the firm, *European Management Review*, pp. 5-15.
- [18] Raaijmakers, M.J.G.C. (2014). Cancun: een joint venture klem tussen contract en instituut. *Ars Aequi*. pp. 459-465.
- [19] Reisberg, A. (May 26, 2013). Shareholder Value after the Financial Crisis: A Dawn of a New Era? *International Corporate Rescue* 143. Available at SSRN: <https://ssrn.com/abstract=2360125>
- [20] Rindova, V.P., and Fombrun, C.J., (Aug. 1999). Constructing Competitive Advantage: The Role of Firm-Constituent Interactions. *Strategic Management Journal*, Vol. 20, No. 8. pp. 691-710.
- [21] Robé, J-P. (2011). The Legal Structure of the Firm. *Accounting, Economics, and Law*, Vol. 1. pp. 1-86.
- [22] Serafeim, G. et al. (2017). Moving Beyond Quarterly Guidance: A Relic of the Past. Focusing Capital on the long run (FCLT).
- [23] Whincop, M.J. (2001). *An Economic and Jurisprudential Genealogy of Corporate Law*, Dartmouth Publishing Co. Ltd.
- [24] Working Paper 23464. <http://www.nber.org/papers/w23464>

## Biofeedback Training for the Recovery of Urinary Continence After Prostatectomy: A Systematic Review

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### Abstract

Post-prostatectomy incontinence (PPI) has various forms of treatment to improve pelvic floor muscle function and biofeedback can accelerate the return to continence. We aimed to systematize scientific evidence on the use of biofeedback in the recovery of PPI. Randomized controlled trials (RCTs) on the treatment of PPI through biofeedback with or without other techniques were selected from MedLine/PubMed, LILACS, Cochrane Library, SciELO, IBECS and PEDro databases using the descriptors prostatectomy AND urinary incontinence AND pelvic floor. Methodological quality was assessed using the Cochrane risk of bias tool and Jadad scale. In all, 61 articles were reviewed and nine which used biofeedback after prostatectomy were selected. In 55.5% (5/9) of the studies, biofeedback presented better results (recovery of continence) compared to other types of treatment or no intervention. Shorter time to recovery of continence was observed in three studies. Biofeedback appears to be an effective option for the recovery of continence after prostatectomy.

**Keywords:** Prostatectomy; Urinary incontinence; Pelvic floor

### Introduction

Prostate cancer (PC) is the second most common cancer in men worldwide, with an estimated 1.1 million new cases according to the latest worldwide estimates dating from 2012 (Ferlay et al., 2015). With the increase in life expectancy, Brazil reports 61,200 new cases of PC and an estimated risk of 61.82 new cases per 100,000 men, with the state of Ceará presenting an estimated rate of 57.52 new cases per 100,000 men (Brasil, 2015).

The definitive treatment method – standard of care – for localized prostate cancer (PC) is radical prostatectomy (RP). However, surgery is an approach that can lead to complications such as urinary incontinence (UI), which is a cause for concern and anxiety among patients. UI in men is common after surgical removal of the prostate and its occurrence will depend on the surgical technique used and the surgeon's experience (Michaelson et al., 2008).

In the procedure, the prostatic urethra is also removed; thus, continence is now maintained by the external urinary sphincter which might require strengthening exercises to recover the ability to resist increases in abdominal pressure and thus hold the urine (Kakihara, Sens, & Ferreira, 2007).

The spontaneous recovery time of urinary continence, which may take from three months to two years after surgery, is still unclear. Therefore, invasive treatments for incontinence must be postponed for at least one year after prostatectomy (Marchiori, Bertaccini, Manferrari, Ferri, & Martorana, 2010; Zequi & Campos, 2010).

Conservative treatment for post-prostatectomy incontinence (PPI) may include various forms of treatment as a way to help improve the function of pelvic floor (PF) muscles, for instance: pelvic floor exercises (PFE), electrical stimulation (ES), biofeedback (BFB) and behavioral therapy (BT), which includes educational activities, or a combination of these techniques.

Physical therapy measures may favor the reduction of urinary incontinence due to increased pelvic muscle contraction strength, increased interval between voids and – consequently – decreased urinary frequency, and decreased degree of loss; additionally, they can also provide patients with greater satisfaction with the quality of life<sup>7</sup>.

The International Continence Society (ICS) recognizes the PFE as first-line treatment for stress urinary incontinence (SUI) in women (Grade A recommendation) and as initial treatment for men with SUI after prostatectomy (Grade B recommendation) (Abrams et al., 2009).

The PFE may be performed through contractions only or contractions associated with BFB – an adjuvant to training capable of accelerating the return to continence (MacDonald, Fink, Huckabay, Monga, & Wilt, 2007). Thus, BFB devices offer patients the ability to coordinate muscular responses through visual and/or audio signals generated by a device, providing an effective contraction (Seleme, Bertotto, & Ribeiro, 2009).

Studies aimed to verify the effectiveness of BFB and compare it with other interventions have shown inconclusive results. Thus, the aim of this review was to systematize the scientific evidence on the use of BFB in the recovery of post-prostatectomy urinary continence.

## Methods

The present review was carried out based on the Methodological Guideline for the development of systematic reviews and meta-analyses of randomized controlled trials of the Ministry of Health of Brazil (Brasil, 2012). The PICO strategy was used to build the following question: "Do prostatectomy patients undergoing pelvic floor biofeedback therapy have better reduction in the degree of urine loss and shorter time to recovery of continence compared to exercises without the use of this technology?"

The literature search was carried out on May 2015 in PubMed, LILACS, MedLine, Cochrane Library, SciELO and PEDro databases using the following descriptors: prostatectomy AND urinary incontinence AND pelvic floor.

The review included randomized clinical trials published in English whose outcomes included the recovery of urinary continence after RP due to PC in individuals at any ages, without period distinction, undergoing training of the PF muscles using the biofeedback device only or combined with other interventions compared with individuals receiving no treatment, placebo treatment or other interventions. Studies that – in addition to PPI – addressed cases of erectile dysfunction or other types of incontinence and articles that could not be fully accessed were excluded.

Initially, the articles were selected for analysis of titles and/or abstracts. Then, full-text articles that potentially addressed the issue were accessed and read in its entirety.

The Cochrane risk of bias tool and the Jadad scale were used to verify the quality of the selected studies. The Cochrane risk of bias tool was used to assess the following criteria: (i) selection bias (random sequence generation/ allocation sequence concealment), (ii) performance bias (blinding of participants and personnel), (iii) bias detection (blinding of outcome assessment), (iv) attrition bias (incomplete outcome data) and (v) reporting bias (selective outcome reporting). In this assessment, each study gets a judgment on the potential risk of bias in each of the areas above and are classified into three categories: "low risk", "high risk" or "unclear risk" (Carvalho, Silva, & Grande, 2013).

The quality scale by Jadad consists of five questions with scores ranging from 0 to 5 in which trials scored less than three points are considered to be of low methodological quality and have a low possibility of extrapolating the results to the scientific community (Jadad et al., 1996).

Given the small number of clinical trials and the wide variability of the proposed interventions, a qualitative analysis of the contents of the selected studies was carried out; however, statistical analysis using a meta-analysis could not be carried out.

## Results

The literature search yielded 321 studies, but only nine were chosen for analysis, as shown by the article selection Flowchart for the systematic review.

In five of the nine studies included in the review (55.5%), the BFB training led to better results in the recovery of continence after RP compared to other groups. However, in four studies, no significant differences were observed in patients using this technology with or without other interventions and/or other treatments (Goode et al., 2011; Floratos et al., 2002; Franke et al., 2000; Ribeiro et al., 2010; Wille, Sobottka, Heidenreich, & Hofmann, 2003). Three studies (33.3%) reported a significant reduction in the time to recovery of continence in the groups using BFB (Mariotti et al., 2009; Ribeiro et al., 2010; Van Kampen et al., 2000). Seven of the selected studies (77.7%) used electromyography-BFB with surface electrodes.

Table 1 shows the descriptive data of the selected studies. There was a great variability of interventions in the groups undergoing BFB therapy: BFB only (Franke et al., 2000); BFB and PFE (Van Kampen et al., 2000); BFB and ES (Ahmed, Mohammed, & Amansour, 2012; Mariotti et al., 2009); BFB and instructions for performing PFE (Floratos et al., 2002; Ribeiro et al., 2010; Tienfort et al., 2012); BFB, ES and instructions for performing PFE (Wille et al., 2003) and BFB, ES, PFE and bladder control strategies (Goode et al., 2011).

The recovery of urinary continence was observed using the pad-test, self-reports of continence, number of incontinence pads and bladder diary. The pad-weighing test (pad-test) proposed and validated by the International Continence Society (ICS) (2002) makes it possible to quantify and classify the urinary incontinence into mild, moderate and severe, based on the weight of a pad previously weighed and reweighed after conducting provocative maneuvers such as coughing and bending. The time needed to carry out the test is also variable – commonly carried out in 20 minutes and 1, 24 or 48 hours. In this review, two authors did not perform this type of test<sup>14,22</sup>. The most commonly used pad-test was the 24-hour test (Ahmed et al., 2012; Mariotti et al., 2009; Ribeiro et al., 2010; Van Kampen et al., 2000).

Likewise, the number of pads used can also be considered an indicator of the improvement or recovery of continence during the treatment, which is verified when patients report they no longer need to use pads. Only two authors did not use this information in their studies (Franke et al., 2000; Goode et al., 2011). Following the same thought, self-reported continence can also be considered to assess the progress made in the treatment. Although subjective, patients are considered continent if they no longer report leaking urine. In this review, two studies used this information (Ahmed et al., 2012; Tienfort et al., 2012).

Regarding the methodological rigor assessed by the Cochrane risk of bias tool, judgments could not be made on performance and detection biases due to the impossibility of blinding in the clinical trials assessed. As for the other criteria, most studies were classified into "low risk" or "unclear risk." With regard to the Jadad scale, two studies scored three points, five studies scored four points and two studies scored five points. Although the present review included only randomized clinical trials for the review, that is, studies with a high degree of scientific evidence, some studies have shown weaknesses in aspects such as the description of randomization and losses. The absence of such information compromises the quality of the studies.

## Discussion

PF muscles exercises are the main physical therapy intervention for the treatment of UI. In theory, BFB training associated with exercises can enhance the urethral closure mechanism and consequently improve continence in addition to representing a playful mode of exercise for the patient. In the long term, BFB training combined with exercises can provide the same efficacy than exercise only. However, in patients with insufficient or lacking awareness of the pelvic floor muscles (PFM), i.e., those who cannot contract or relax properly, the BFB is an excellent tool to provide muscle awareness (Berghmans, 2014).

In general, the recovery of continence occurs for most prostatectomized individuals. However, according to the studies reviewed, the association with BFB showed high success rates ranging 62.5%-96.7% while in the other groups these rates ranged 6.2%-81%. Noteworthy, one study showed the lowest success rate (62.5%) while the others that have reported positive effects with the use of this technology found continence rates above 95% (Tienfort et al., 2012). In addition, the BFB not only speeds up the recovery of continence, but also allows the improvement of the degree of incontinence, urinary symptoms and PFM strength after 12 months postoperatively (Ribeiro et al., 2010).

Review studies on the effect of BFB training on the treatment of PPI are scarce and its effectiveness is still unclear. According to a Cochrane review conducted in 2015 involving 2,736 men undergoing conservative intervention, PFE with or without BFB did not prove to be better than the control for men with PPI, reflecting uncertainties (Anderson et al., 2015).

In this perspective, a systematic review was conducted to assess the effect of the exercises in patients with PPI (MacDonald et al., 2007). Based on the available evidence, it was found that PFE with or without BFB not only improved but also sped up the return of continence compared to men with PPI who performed no exercises.

In the present review, several factors prevented the comparison between the analyzed studies – for instance, the lack of standardization of interventions, methods of assessment and classification of UI, and the beginning and duration of treatment. Furthermore, the combination of various interventions hinders critical analysis and prevents statistical analysis through meta-analysis.

## Conclusion

Physical therapy interventions should be the first treatment option for patients with UI after prostatectomy. The BFB training appears to be an effective option to assist in the recovery of continence. However, it depends on the use of specific equipment, which may require financial investment from institutions, although they have a reasonable cost compared to the surgery to treat UI.

In order to provide a standardization that will contribute to increase scientific evidence and reliability of the BFB training, further research with good degrees of evidence should be conducted from the reproduction of those that have greater methodological rigor.

## References

- [1] Abrams, P., Andersson, K. E., Birder, L., Brubaker, L., Cardozo, L., Chapple, C.,... Wyndaele, J. (2009). Fourth international consultation on incontinence recommendations of the international scientific committee: evaluation and treatment of urinary incontinence, pelvic organ prolapse, and fecal incontinence. *Neurourology and Urodynamics*, 29, 213-40.
- [2] Ahmed, M. T., Mohammed, A. H., & Amansour, A. (2012). Effect of Pelvic Floor Electrical Stimulation and Biofeedback on the Recovery of Urinary Continence after Radical Prostatectomy. *Turkish Journal of Physical Medicine and Rehabilitation*, 58, 170-176.
- [3] Anderson, C. A., Omar, M. I., Campbell, S. E., Hunter, K. F., Cody, J. D., & Glazener, C. M. (2015). Conservative management for postprostatectomy urinary incontinence (reviews). *The Cochrane Database of Systematic Reviews*, 1:CD001843.
- [4] Berghmans, B. (2014). Novas perspectivas de fisioterapia do assoalho pélvico. In: Palma, P. (Ed.). *Urofisioterapia: Aplicações clínicas das técnicas fisioterapêuticas nas disfunções miccionais e do assoalho pélvico*. São Paulo: Personal Link Comunicações.
- [5] Brasil. Ministério da Saúde. (2012). Diretrizes Metodológicas: elaboração de revisão sistemática e metanálise de ensaios clínicos randomizados. Brasília: Editora do Ministério da Saúde.
- [6] Brasil. Ministério da Saúde. Instituto Nacional de Câncer José Alencar Gomes da Silva. (2015). Estimativa 2016: incidência de câncer no Brasil. Rio de Janeiro: INCA. 124 p.
- [7] Carvalho, A. P., Silva, V., & Grande, A. J. (2013). Avaliação do risco de viés de ensaios clínicos randomizados pela ferramenta da colaboração Cochrane. *Diagnóstico & Tratamento*, 18, 38-44.
- [8] Ferlay, J., Soerjomataram, I., Dikshit, R., Eser, S., Mathers, C., Rebelo, M.,... Bray, F. (2015). Cancer incidence and mortality worldwide: Sources, methods and major patterns in GLOBOCAN 2012. *International Journal of Cancer*, 136, 359-386.
- [9] Floratos, D. L., Sonke, G. S., Rapidou, C. A., Alivizatos, G. J., Deliveliotis, C., Constantinides, C. A., & Theodorou, C. (2002). Biofeedback vs verbal feedback as learning tools for pelvic muscle exercises in the early management of urinary incontinence after radical prostatectomy. *BJU International*, 89, 714-719.
- [10] Franke, J. J., Gilbert, W. B., Grier, J., Koch, M. O., Shyr, Y., & Smith, J. A. Jr. (2000). Early post-prostatectomy pelvic floor biofeedback. *The Journal of Urology*, 163, 191-193.
- [11] Goode, P. S., Burgio, K. L., Johnson, T. M., Clay, O. J., Roth, D. L., Markland, A. D., ... Lloyd, L. K. (2011). Behavioral Therapy With or Without Biofeedback and Pelvic Floor Electrical Stimulation for Persistent Post-

- Prostatectomy Incontinence – A Randomized Controlled Trial. *JAMA*, 305, 151–159. <http://doi.org/10.1001/jama.2010.1972>.
- [12] International Continence Society (ICS). (2002). Initial assessment of incontinence. Retrieved from: [http://www.ics.org/publications/ici\\_4/files-book/comite-5A-B.pdf](http://www.ics.org/publications/ici_4/files-book/comite-5A-B.pdf).
- [13] Jadad, A. R., Moore, R. A., Carroll, D., Jenkinson, C., Reynolds, D. J., Gavaghan, D. J., & McQuay, H. J. (1996). Assessing the quality of reports of randomized clinical trials: is blinding necessary? *Controlled Clinical Trials*, 17, 1-12.
- [14] Kakiara, C. T., Sens, Y. A. S., & Ferreira, U. (2007). Efeito do treinamento funcional do assoalho pélvico associado ou não à eletroestimulação na incontinência urinária após prostatectomia radical. *Revista Brasileira de Fisioterapia*, 11, 481-486.
- [15] Kubagawa, L. M., Pellegrini, J. R. F., Lima, V. P., & Moreno, A. L. (2006). A eficácia do tratamento fisioterapêutico da incontinência urinária masculina após prostatectomia. *Revista Brasileira de Cancerologia*, 52, 179-185.
- [16] MacDonald, R., Fink, H. A., Huckabay, C., Monga, M., & Wilt, T. J. (2007). Pelvic floor muscle training to improve urinary incontinence after radical prostatectomy: a systematic review of effectiveness. *BJU International*, 100, 76-81.
- [17] Marchiori, D., Bertaccini, A., Manferrari, F., Ferri, C., & Martorana, G. (2010). Pelvic floor rehabilitation for continence recovery after radical prostatectomy: role of a personal training re-educational program. *Anticancer Research*, 30, 553-556.
- [18] Mariotti, G., Sciarra, A., Gentilucci, A., Salciccia, S., Alfarone, A., Di Pierro, G., & Gentile, V. (2009). Early recovery of urinary continence after radical prostatectomy using early pelvic floor electrical stimulation and biofeedback associated treatment. *The Journal of Urology*, 181, 1788-1793.
- [19] Michaelson, M. D., Cotter, S. E., Gargollo, P. C., Zietman, A. L., Dahl, D. M., & Smith, M. R. (2008). Management of Complications of Prostate Cancer Treatment. *CA: A Cancer Journal for Clinicians*, 58, 196–213. <http://doi.org/10.3322/CA.2008.0002>
- [20] Ribeiro, L. H., Protá, C., Gomes, C. M., de Bessa, J. Jr., Boldarine, M. P., Dall'Oglio, M. F.,...Srougi, M. (2010). Long-term effect of early postoperative pelvic floor biofeedback on continence in men undergoing radical prostatectomy: a prospective, randomized, controlled trial. *The Journal of Urology*, 184, 1034-1039.
- [21] Seleme, M. R., Bertotto, A., & Ribeiro, V. W. (2009). Exercícios Hipopressivos. In: Palma, P. C. R. (Ed.). *Urofisioterapia: Aplicações Clínicas das Técnicas Fisioterapêuticas nas Disfunções Miccionais e do Assoalho Pélvico*. (pp. 295- 306). Campinas/SP: Personal Link Comunicações Ltda.
- [22] Tienfort, D., Sacco, E., Marangi, F., D'Addessi, A., Racioppi, M., Gulino, G., Pinto, F.,...Bassi, P. (2012). Efficacy of an assisted low-intensity programme of perioperative pelvic floor muscle training in improving the recovery of continence after radical prostatectomy: a randomized controlled trial. *BJU International*, 110, 1004-1011.
- [23] Van Kampen, M., De Weerd, W., Van Poppel, H., De Ridder, D., Feys, H., & Baert, L. (2000). Effect of pelvic-floor reeducation on duration and degree of incontinence after radical prostatectomy: a randomised controlled trial. *Lancet*, 355, 98-102.
- [24] Wille, S., Sobottka, A., Heidenreich, A., & Hofmann, R. (2003). Pelvic floor exercises, electrical stimulation and biofeedback after radical prostatectomy: results of a prospective randomized trial. *The Journal of Urology*, 170, 490–493.
- [25] Zequi, S. C., & Campos, R. S. M. (2010). Câncer de próstata localizado. In: Nardozza Júnior, A., Zerati Filho, M., & Reis, R. B (Eds.). *Urologia Fundamental*. São Paulo: Planmark.

## Clinical and Environmental Factors Associated with Pulmonary Tuberculosis in Prisoners in Northeastern Brazil

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### Abstract

This study aimed to assess clinical and environmental factors associated with pulmonary tuberculosis in prisoners. We carried out a documentary, retrospective, epidemiological study of records of tuberculosis cases in a prison hospital in Northeastern Brazil. The sample consisted of data from medical records of prisoners diagnosed with TB from January 2015 to January 2016. Information such as age, race, marital status, education level, weight, height, harmful habits, and clinical data on mucous membrane, cough, sputum, breathing pattern, bacilloscopy, initiation and type of treatment, treatment duration, prison of origin and time spent in prison were assessed. A total of 109 medical records of prisoners were analyzed. Mean age was 28.5 ( $\pm$  7.9) years, and most prisoners ( $n=87$ ; 79.8%) were single. In all, 78.0% ( $n=85$ ) of the prisoners had primary education and 73.4% ( $n=80$ ) were self-declared *Pardos* (mixed-race Brazilians). Statistically significant associations were found between level of education and prevalence of cough ( $p=.042$ ), time in prison and presence of cough ( $p=.014$ ), and BMI and mucous membrane coloration ( $p=.001$ ). The habits of most prisoners are different from those expected for a good quality of life. In addition, the health conditions of prisoners also contribute to the infection. These findings emphasize the need for actions targeted at eliminating tuberculosis in prisoners and actions to raise awareness about hygiene and life habits.

**Keywords:** Tuberculosis; Tuberculosis in Prisons; Epidemiology; Cough.

### Introduction

Pulmonary tuberculosis (TB) is still a major public health problem worldwide. In 2015, 10.4 million people fell ill with TB and 1.8 million died from the disease. Over 95% of TB deaths occur in low- and middle-income countries, including Brazil (World Health Organization [WHO], 2016).

Official data from Brazil show that there were 73,000 new cases of pulmonary tuberculosis (TB) between 2005 and 2014, with 4,577 deaths in 2013 (Brasil, 2015). Within this context, Brazil ranks 16<sup>th</sup> in number of TB cases among the 22 high-

burden countries that account for over 80% of the world's TB cases. The TB incidence rate estimated for 2015 in Brazil was 84/100,000 inhabitants (WHO, 2016).

Tuberculosis in prisons is a major challenge to TB control. Eliminating TB in prisons is complex and depends on other aspects of both the health and criminal justice systems, and the cultural, historical, and economic situations of each country (Dara et al., 2015).

In recent years, there has been an increase in Pulmonary Tuberculosis (TB) in prisons in both developed and developing countries (Baussano et al., 2010). The prevalence of TB in prisons is up to 100 times higher than that of the civilian population in both low- and high-income countries (WHO, 2014). Therefore, the occurrence of TB in prisons has a significant relevance for public health, particularly in Brazil, where incarceration rates continue to grow (Brasil, 2014a).

In the State of Ceará, located in Northeastern Brazil, 3.4% of a population of 620,000 inhabitants were incarcerated in 2014, which corresponds to a prison population of 21,000 inmates and an increase of 67% compared with the year 2008 (Secretaria Estadual de Justiça do Ceará, 2014). In addition to overcrowding, prisons lack hygiene and infection control, which makes inmates vulnerable to infectious diseases (Sarang, Platt, Vyshemirskaya, & Rhodes, 2016). The latest data from the Ceará Correctional System Coordination Office have reported a total of 24,472 prisoners in the state (Secretaria Estadual de Justiça do Ceará, 2016).

TB diagnosis includes some fundamental procedures, such as radiological, serological, biochemical, histological, pathological, bacteriological and tuberculin tests. Clinical examination should check for cough, sputum and weight loss, which are the most common symptoms. Importantly, a positive sputum culture is proof for infection (Ryu, 2015).

Given that, the present research aimed to assess clinical and environmental factors associated with pulmonary tuberculosis in prisoners.

## Material and Methods

This is a quantitative retrospective epidemiological study that carried out a documentary analysis of medical records of prisoners diagnosed with tuberculosis. The study was conducted from February to April 2017 at the Professor Otávio Lobo Prison Hospital and Sanatorium, located in the municipality of Itaitinga, state of Ceará, Northeastern Brazil. The hospital is a reference in the male correctional system of the state and opened in 1968.

The sample consisted of data from medical records of prisoners diagnosed with TB from January 2015 to January 2016. Information such as age, race, marital status, education level, weight, height, harmful habits, and clinical data on mucous membrane, cough, sputum, breathing pattern, bacilloscopy, initiation and type of treatment, treatment duration, prison of origin and time spent in prison were assessed.

The information collected were initially organized in an Excel spreadsheet and later analyzed using the Statistical Package for the Social Sciences for Windows (SPSS Inc. Chicago, IL, USA), version 22.0. Categorical variables are described as absolute and relative frequencies and mean, median, standard deviation, and minimum and maximum values. The Chi-squared test and Fisher's Exact Test were used to check for associations between categorical variables. P-value was set at  $p < 0.05$ .

The study is part of a larger research project entitled "Prison Health: the reality of a prison in the State of Ceará", which was approved by the Research Ethics Committee of the Faculdade Metropolitana da Grande Fortaleza – FAMETRO under Approval No. 1.937.168. Written informed consent was obtained from the legal representative responsible for the patients' medical records.

## Results

A total of 109 medical records of prisoners admitted to the prison hospital were analyzed. Age ranged 18 to 58 years, with a mean of 28.5 ( $\pm 7.9$ ) years.

Ages 18 to 29 years (72; 66.1%) and single individuals (89; 81.7%) predominated. Most of the prisoners had 1 to 5 years of study (56; 51.4%), 80 (73.4%) were self-declared *Pardos* (Mixed-race Brazilians), 55 (50.5%) were underweight, and 46 (42.2%) had been in prison for 1-3 years.

After the diagnosis of tuberculosis, the treatment took on average 13.4 ( $\pm 53.5$ ) days to be started, and the result of the sputum smear examination for control took an average of 43.2 ( $\pm 93.0$ ) days.

According to data from the records, 76 (69.7%) of the prisoners had pale mucous membranes, 105 (96.3%) presented with cough, 91 (83.5%) had sputum production, 93 (85.3%) had positive bacilloscopy, and only 12 (11.0%) had normal breathing pattern.

The bivariate analysis of health conditions (presence of pale mucous membranes, cough, sputum, breathing pattern, and positive Bacilloscopy) detected statistically significant association of positive Bacilloscopy with age group ( $p=0.042$ ) and time spent in prison ( $p=0.028$ ). In addition, Body Mass Index (BMI) was associated with pale mucous membranes ( $p=0.009$ ), cough ( $p=0.026$ ) and sputum production ( $p=0.046$ ).

Table 1 describes the analysis of the association between the characteristics of the medical records of prisoners following treatment for TB and their sociodemographic characteristics (Table 1).

Table 2 describes data on harmful habits (smoking, alcohol, illicit drug use). In all, 70 (64.2%) prisoners reported smoking, 35 (32.1%) reported drinking, and 29 (26.6%) reported using illicit drugs. There was a statistically significant association between drinking and sputum production ( $p=0.037$ ) (Table 2).

## Discussion

Tuberculosis is a major health problem in prisons and it can generate costs to both the prison and health care systems. Thus, it is important to identify the main risk factors for TB in prisoners in order to prevent its onset and spread. If proper attention is given to the risk factors for TB, especially in the more susceptible populations, such as prisoners, such a major health problem may be more easily prevented. Therefore, the present study provides evidence on the risk factors for TB in prisoners that can assist policy makers in the development of actions to tackle TB in prisons.

About 607,731 people are in prison in Brazil. One of the concerns with this population group is related to the health of these individuals, mainly with regard to Tuberculosis (Negreiros & Vieira, 2017). The growing epidemic of tuberculosis in prisons is associated with the lack of effective control of tuberculosis within these institutions, such as late diagnosis and failure to isolate prisoners with symptoms or suspected TB and failure to provide treatment (Souza et al., 2012). Thus, poor hygiene conditions, greater physical contact between prisoners and high rates of TB in prisons demonstrate the need for constant epidemiological surveillance among incarcerated population groups in order to determine the health indicators and vulnerability factors in prison populations.

In the present study, the mean age of infection was 28.5 years, which is consistent with other studies that confirm that highest tuberculosis rates are found in people aged 20-30 years (Owokuhaiza, Thokerunga, & Bazira, 2014).

The mean age found in the present study is similar to that found by Alarcón-Robayo et al. (2016) in a study carried out in ten prisons in Colombia, where the mean age found was 27 years. However, such condition may vary across countries and regions. For instance, research carried out in South Africa shows that 52% of inmates with TB were aged 31–40 years (Nyasulu, Mogoere, Umanah, & Setswe, 2015).

In our research, 73.4% of the prisoners with tuberculosis had only elementary education. This fact corroborates the pattern found in the Brazilian prison population (Brasil, 2014b). These findings confirm that, in addition to being in prison, people with low levels of education are more likely to be infected with TB – most of the prisoners (78%) had only one to nine years of study, and more than half of these (51.4%) had only one to five years of study. Thus, these factors synergistically disadvantage imprisoned people compared with the general population (Jones, Craig, Valway, Woodley, & Schaffner, 1999).

Most of the prisoners analyzed in our study (73.4%) declared themselves to be *Pardos* (Mixed-race Brazilians). This race was also predominant in a study conducted in the city of São Luis, Northeastern Brazil (Câmara et al., 2016).

Research on the risk factors for TB in prisoners has highlighted malnutrition (Kalonji et al., 2016). This finding is consistent with the statistically significant association between underweight and epidemiological characteristics of prisoners with TB (presence of pale mucosa  $p=0.009$ , cough  $p=0.023$ , and sputum production  $p=0.046$ ) in the present study.

The symptoms presented by most of the prisoners are consistent with the symptoms of tuberculosis, although most of them have presented with normal breathing pattern (89%). It should be noted, however, that TB is not always accompanied by changes in breathing patterns (Ferreira et al., 2005). Although coughing had low yields in tuberculosis screening (Valença, Cezar-Vaz, Brum, & Almeida da Silva, 2016), the statistically significant association between cough ( $p=0.026$ ) and underweight in prisoners is corroborated by a study in which 68.8% of the prisoners interviewed presented with cough lasting 2 or more weeks and 40.7% reported weight loss (Owokuhaia, Thokerunga, & Bazira, 2014).

Time spent in prison is one of the factors that predisposes the prisoner to have tuberculosis (Silva Junior, 2004). In this regard, the longer the time in prison, specifically more than 12 months of imprisonment, the greater the chances of developing tuberculosis symptoms (Valença, Possuelo, Cezar-Vaz, & Almeida da Silva, 2016). In the present study, 96.4% of the inmates who had been in prison for more than five years presented positive bacilloscopy ( $p=0.028$ ). These are the most cited symptoms in previous studies (Nogueira & Abrahão, 2009; WHO, 2000).

Secretion with blood seldom occurs in cases of *Mycobacterium tuberculosis* infection (Silva Junior, 2004). This finding is in agreement with that of the present study. According to data from the medical records, tuberculosis was diagnosed using smear microscopy and x-ray, the latter being a complementary examination. The majority (85.3%) of the prisoners tested positive and began the treatment right away. The time spent between diagnosis and the beginning of treatment was on average 13 days. In a study carried out in a prison in Rio Grande do Sul, the time taken to start treatment was on average 24 hours after the diagnostic confirmation (Valença, Possuelo, Cezar-Vaz, & Almeida da Silva, 2016). Another study has shown that inmates who tested negative (sputum smear and x-ray) also received anti-tuberculosis therapy as a form of chemoprophylaxis, as this process can prevent possible contamination of healthy prisoners (Aerts et al., 2000).

According to the World Health Organization (Oliveira et al., 2014), the BMI of most prisoners (56.8%) is within the range of 18.5 to 24.9 ( $\text{kg}/\text{m}^2$ ), which indicates that the individual is at normal weight. In another study, weight loss and lack of appetite were observed in only 3.2% of prisoner. On the other hand, in some Colombian prisons, weight loss was found in 16.8% of prison inmates with tuberculosis (Alarcón-Robayo et al., 2013).

In the present, half of the inmates were underweight (50.5%) and there was a statistically significant association of BMI reduction with pale mucosa ( $p=0.009$ ), cough ( $p=0.026$ ) and sputum ( $p=0.046$ ). One of the signs observed in the patients was the pale mucosa, which may be related to xerostomia, that is, insufficient production of saliva. Xerostomia can have a subjective etiology, without evidence of alteration as to the salivary flow (Fávaro, Ferreira, & Martins, 2006). In this case, this sign may be associated with psychological factors, since deprivation of freedom entails mental problems (Valença, Possuelo, Cezar-Vaz, & Almeida da Silva, 2016).

Another important issue that should be highlighted is the fact that most of the inmates with TB were smokers (64.2%). Although there was no statistically significant association between harmful habits and TB, the high percentage of inmates who reported harmful habits and presented with cough, sputum production and positive bacilloscopy should be highlighted. Importantly, all the inmates were receiving hospital treatment, which may certainly have influenced such causality.

Smoking is considered a potential risk factor for pulmonary infections, including tuberculosis, since cigarette smoke promotes the reduction of mucociliary clearance of the respiratory tract, increasing the adherence of bacteria and breaking the protective epithelium (Rabahi, 2012). It has also been demonstrated that life habits prior to imprisonment are important factors for the diagnosis and treatment of tuberculosis (Severo, Leite, Capela, & Simões, 2007).

Although most of the inmates were not drinkers, almost all of those who reported drinking (35; 32.1%) presented with sputum production, with a statistically significant association between these variables ( $p=0.037$ ).

Use of illicit drugs was reported by 26.6% of the inmates, but it was not significantly associated with other variables. However, all the inmates who reported using illicit drugs presented with cough and nearly all the inmates who reported using illicit drugs presented with pale mucosa, sputum production and positive bacilloscopy.

Illicit drug users constitute a group at high risk for tuberculosis and other diseases. The physiological effects of drug use, along with the environment and risk behaviors of drug users, may contribute to the high prevalence of TB among drug users, thus demonstrating the importance of strategies for TB control among drug users, particularly when it can be combined with drug rehabilitation (Deiss, Rodwell, & Garfein, 2009).

The present study showed that TB is more prevalent in younger age groups and lower BMI in imprisoned individuals. These findings suggest that TB in prisoners may be associated with the living habits they have been exposed to.

It is known that the architecture of prisons and the general living conditions in these facilities increase the risk for TB. In addition, the time spent in prison increases exposure to such conditions and therefore to TB, which is also influenced by illicit drug use (Nyasulu et al., 2015).

These findings emphasize the need for actions within the prisons aimed at tracing inmates with the characteristics presented in the present study. Also, there should be actions to raise awareness of the importance of hygiene and living habits of prisoners and the community in order to minimize damage to physical and psychological health. After all, these prisoners are not totally restrained from the bond with the community, since they receive visits and have direct contact with penitentiary agents and health professionals.

It should be noted that only one single prison was included in the present research, which prevents its results from being extrapolated, thus constituting a limitation of the present study. However, the study was conducted in a large prison hospital in Northeastern Brazil; therefore, its results may also be found in other prisons and hence allow the measurement of the impact of TB in addition to serving as a basis for improving public health care policies targeted at prison populations.

Thus, although the present study is limited to one single large prison hospital, it is expected to draw attention to the magnitude of the problem and the need for further research on the issue globally.

## Conclusion

TB is more prevalent in younger age groups and lower BMI in imprisoned individuals. These findings suggest that TB in prisoners may be associated with the living habits they have been exposed to. In addition, the time spent in prison increases exposure to such conditions and therefore to TB, which is also influenced by illicit drug use.

It should be noted that prison time was a relevant factor for acquiring the disease and that the majority of the inmates presented with cough, weight loss, smoking, pale mucosa and clinically altered secretion.

The habits of most prisoners are different from those expected for a good quality of life. In addition, the health conditions of prisoners also contribute to the infection. These findings emphasize the need for actions targeted at eliminating tuberculosis in prisoners and actions to raise awareness about hygiene and life habits.

## References

- [1] Aerts, A., Habouzit, M., Mschiladze, L., Malakmadze, N., Sadradze, N., Menteshashvili, O.,...Sudere, P. (2000). Pulmonary tuberculosis in prisons of the ex-USSR state Georgia: results of a nation-wide prevalence survey among sentenced inmates. *International Journal of Tuberculosis and Lung Disease*, 4:1104-1110.
- [2] Alarcón-Robayo, J. F., Martínez-Casallas, L., Sánchez, M. S., Valderrama-Mendoza, J. S., Enriquez, D. M. B., & Jiménez-Canizales, C. E. (2016). Prevalencia de tuberculosis pulmonar en población privada de la libertad de 10 centros penitenciarios en Colombia, 2013. *Acta Médica Peruana*, 33, 202-207.
- [3] Baussano I., Williams, B. G., Nunn, P., Beggiato, M., Fedeli, U., & Scano, F. (2010). Tuberculosis incidence in prisons: a systematic review. *PLoS Medicine*, 7, e1000381.
- [4] Brasil. Ministério da Saúde. Boletim Epidemiológico Tuberculose. (2015). Retrieved from: <http://portalarquivos.saude.gov.br/images/pdf/2015/marco/25/Boletim-tuberculose-2015.pdf>.
- [5] Brasil. Ministério da Saúde. Mapa do Encarceramento: os jovens do Brasil. (2014a). Brasília: Ministério da Saúde. Retrieved from: [http://juventude.gov.br/articles/participatorio/0010/1092/Mapa\\_do\\_Encarceramento\\_-\\_Os\\_jovens\\_do\\_brasil.pdf](http://juventude.gov.br/articles/participatorio/0010/1092/Mapa_do_Encarceramento_-_Os_jovens_do_brasil.pdf).
- [6] Brasil. Ministério da Saúde. Programa Nacional de Controle da Tuberculose. Situação da Tuberculose no Brasil. (2014). Brasília: Ministério da Saúde. Retrieved from: <http://bvsms.saude.gov.br/bvs/publicacoes/ProgramaTB.pdf>.
- [7] Câmara, J. T., Menezes, J. B., Pereira, B. M., Oliveira, T. R. C., Oliveira, T. M. P., & Ribeiro, N. S. (2016). Perfil epidemiológico de pacientes com diagnóstico de resistência de mycobacterium tuberculosis. *Revista de enfermagem UFPE*, 10, 4082-4089.

- [8] Dara, M., Acosta, C. D., Melchers, N. V. S. V., Al-Darraj, H. A. A., Chorgoliani, D., Reyes, H.,...Migliori, G. B. (2015). Tuberculosis control in prisons: current situation and research gaps. *International Journal of Infectious Diseases*, 32, 111–117.
- [9] Deiss, R. G., Rodwell, T. C., & Garfein, R. S. (2009). Tuberculosis and Drug Use: Review and Update. *Clinical Infectious Diseases*, 48, 72-82.
- [10] Fávaro, R. A. A., Ferreira, T. N. R., & Martins, W. D. (2006). Xerostomia: etiologia, diagnóstico e tratamento. *Revista de Clínica e Pesquisa Odontológica*, 2, 303-317.
- [11] Ferreira, A. A. A., Queiroz, K. C. S., Torres, K. P., Ferreira, M. A. F., Accioly, H., & Alves, M. S. C. F. (2005). Os fatores associados à tuberculose pulmonar e a baciloscopia: uma contribuição ao diagnóstico nos serviços de saúde pública. *Revista Brasileira de Epidemiologia*, 8, 142-149.
- [12] Jones, T. F., Craig, A. S., Valway, S. E., Woodley, C. L., & Schaffner, W. (1999). Transmission of tuberculosis in a jail. *Annals of Internal Medicine*, 131, 557-63.
- [13] Kalonji, G. M., De Connick, G., Okenge Ngongo, L., Kazumba Nsaka, D., Kabengele, T., Tshimungu Kandolo, F., ... Giet, D. (2016). Prevalence of tuberculosis and associated risk factors in the Central Prison of Mbuji-Mayi, Democratic Republic of Congo. *Tropical Medicine and Health*, 44, 30. <http://doi.org/10.1186/s41182-016-0030-9>.
- [14] Negreiros, D. E. H., & Vieira, D. S. (2017). Prevalência de hepatites b, c, sífilis e hiv em privados de liberdade - Porto Velho, Rondônia. *Revista Interdisciplinar*, 10, 43-52.
- [15] Nogueira, P. A., & Abrahão, R. M. C. M. (2009). A infecção tuberculosa e o tempo de prisão da população carcerária dos Distritos Policiais da zona oeste da cidade de São Paulo. *Revista Brasileira de Epidemiologia*, 12, 30-8.
- [16] Nyasulu, P., Mogoere, S., Umanah, T., & Setswe, G. (2015). Determinants of Pulmonary Tuberculosis among Inmates at Mangaung Maximum Correctional Facility in Bloemfontein. South Africa. *Tuberculosis Research and Treatment*, 2015, 752-709.
- [17] Oliveira, M. G., Delogo, K. N., Oliveira, H. M. M. G., Ruffino-Netto, A., Kritski, A. L., & Oliveira, M. M. (2014). Anemia in hospitalized patients with pulmonary tuberculosis. *Jornal Brasileiro de Pneumologia*, 40, 403-410.
- [18] Owokuhaia, J., Thokerunga, E., & Bazira, J. (2014). Prevalence of Pulmonary Tuberculosis among Prison Inmates at Mbarara Central Prison, South Western Uganda. *Advances in Research*, 2, 618–625. <http://doi.org/10.9734/AIR/2014/10676>.
- [19] Rabahi, M. F. (2012). Tuberculose e tabagismo. *Revista Pulmão RJ*, 21, 46-49.
- [20] Ryu, Y. J. Diagnosis of Pulmonary Tuberculosis: Recent Advances and Diagnostic Algorithms. (2015). *Tuberculosis and Respiratory Diseases*, 78, 64-71. doi:10.4046/trd.2015.78.2.64.
- [21] Sarang, A., Platt, L., Vyshemirskaya, I., & Rhodes, T. (2016). Prisons as a source of tuberculosis in Russia. *International Journal of Prisoner Health*, 12, 45-56.
- [22] Secretaria Estadual de Justiça do Ceará (BR). Monitoramento semanal do efetivo de presos nas unidades prisionais do Ceará. Ceará. (2014). Retrieved from: <http://www.mpce.mp.br/wp-content/uploads/2016/03/Portaria-1220.2014-Regimento-dos-Estabelecimentos-Prisionais-Cear%C3%A1.pdf>.
- [23] Secretaria Estadual de Justiça do Ceará (Brasil). Coordenadoria do Sistema Penal. Núcleo de dados e estatística. Monitoramento semanal do efetivo de presos nas unidades prisionais do Ceará. (2016). Retrieved from: <file:///C:/Users/User/Downloads/relatrio%20semanal%20externo%20-%202023.12.14.pdf>.
- [24] Severo, N. P. F., Leite, C. Q. F., Capela, M. V., & Simões, M. J. S. (2007). Características clínico-demográficas de pacientes hospitalizados com tuberculose no Brasil, no período de 1994 a 2004. *Jornal Brasileiro de Pneumologia*, 33, 565-571.
- [25] Silva Junior, J. B. (2004). Tuberculose: Guia de Vigilância Epidemiológica. *Jornal Brasileiro de Pneumologia*, 30, S57-S86.
- [26] Souza, K. M. J., Villa, T. C. S., Assolini, F. E. P., Beraldo, A. A., França, U. M., Protti, S. T., & Palha, P. F. (2012). Atraso no diagnóstico da tuberculose em sistema prisional: a experiência do doente apenado. *Texto & Contexto - Enfermagem*, 21, 17-25.
- [27] Table 1. Analysis of the association between characteristics of medical records of prisoners following treatment for TB (n=109) and sociodemographic characteristics. Fortaleza, Ceará, Brazil, 2017.
- [28] Valença, M. S., Cezar-Vaz, M. R., Brum, C. B., & Almeida da Silva, P. E. (2016). O processo de detecção e tratamento de casos de tuberculose em um presídio. *Ciência & Saúde Coletiva*, 21, 2111-2122.

- [29] Valença, M. S., Possuelo, L. G., Cezar-Vaz, M. R., & Almeida da Silva, P. E. (2016). Tuberculose em presídios brasileiros: uma revisão integrativa da literatura. *Ciência & Saúde Coletiva*, 21, 2147-2160.
- [30] World Health Organization. (2000). The control of tuberculosis in prisons: a manual for program managers. Retrieved from: [http://apps.who.int/iris/bitstream/10665/66823/1/WHO\\_CDS\\_TB\\_2000.281.pdf](http://apps.who.int/iris/bitstream/10665/66823/1/WHO_CDS_TB_2000.281.pdf).
- [31] World Health Organization. Global tuberculosis report. (2016). Retrieved from: [http://www.who.int/tb/publications/global\\_report/gtbr2016\\_executive\\_summary.pdf](http://www.who.int/tb/publications/global_report/gtbr2016_executive_summary.pdf).
- [32] World Health Organization. Tuberculosis in prisons. (2014). Retrieved from: <http://www.who.int/tb/areas-of-work/population-groups/prisons-facts/en/>.

Variables	n (%)	Pale mucosa n= 76 (69.7%)	Cough n=105 (96.3%)	Sputum n=91 (83.5%)	Abnormal breathing pattern n=12 (11.0%)	Positive bacilloscopy n=93 (85.3)
Age group						
18 to 29 years	72 (66.1)	49 (68.1)	70 (97.2)	60 (83.3)	7 (9.7)	65 (90.3)
30 to 39 years	23 (21.1)	17 (73.9)	21 (91.3)	20 (87.0)	3 (13.0)	19 (82.7)
40 years and over	14 (12.8)	10 (71.4)	14 (100)	11 (78.6)	2 (14.3)	9 (64.3)
p value		0.950 <sup>2</sup>	0.270 <sup>2</sup>	0.857 <sup>2</sup>	0.721 <sup>2</sup>	0.042 <sup>2</sup>
Marital status						
With partner	20 (18.3)	15 (75)	18 (90)	14 (70.0)	2 (10.0)	15 (75.0)
Without partner	89 (81.7)	61 (68.5)	87 (97.8)	77 (86.5)	10 (11.2)	78 (87.6)
p value		0.570 <sup>1</sup>	0.153 <sup>2</sup>	0.095 <sup>2</sup>	1.000 <sup>2</sup>	0.167 <sup>2</sup>
Years of study						
None	3 (2.8)	2 (66.7)	2 (66.7)	2 (66.7)	-	2 (66.7)
1 to 5 years	56 (51.4)	38 (67.9)	55 (98.2)	45 (80.4)	8 (14.3)	48 (85.7)
6 to 9 years	29 (26.6)	20 (69)	28 (96.6)	26 (89.7)	3 (10.3)	25 (86.2)
More than 9 years	21 (19.3)	16 (76.2)	20 (95.2)	18 (85.7)	1 (4.8)	18 (85.7)
p value		0.917 <sup>2</sup>	0.138 <sup>2</sup>	0.470 <sup>2</sup>	0.687 <sup>2</sup>	0.694 <sup>2</sup>
Race						
White	11 (10.1)	6 (54.5)	11 (100)	10 (90.9)	-	9 (81.8)
Black	18 (16.5)	13 (72.2)	17 (94.4)	14 (77.8)	3 (16.3)	15 (83.3)
Pardo	80 (73.4)	57 (71.3)	77 (96.3)	67 (83.8)	9 (11.3)	69 (86.3)
p value		0.512 <sup>2</sup>	0.716 <sup>2</sup>	0.691 <sup>2</sup>	0.457 <sup>2</sup>	0.735 <sup>2</sup>
BMI						
Underweight	55 (50.5)	45 (81.1)	54 (98.2)	48 (87.3)	7 (12.7)	49 (89.1)
Normal weight	46 (42.2)	25 (54.3)	45 (97.8)	39 (84.8)	5 (10.9)	38 (82.6)
Excess weight	8 (7.3)	6 (75.0)	6 (75.0)	4 (50.0)	-	6 (75.0)
p value		0.009 <sup>2</sup>	0.026 <sup>2</sup>	0.046 <sup>2</sup>	0.899 <sup>2</sup>	0.326 <sup>2</sup>
Time in prison						
< 1 year	16 (14.7)	13 (81.3)	15 (93.8)	15 (93.8)	2 (12.5)	10 (62.5)
1  -- 3 years	46 (42.2)	30 (65.2)	43 (93.5)	36 (78.3)	5 (10.9)	39 (84.8)
3  -- 5 years	19 (17.4)	13 (68.4)	19 (100.0)	17 (89.5)	2 (10.5)	17 (89.5)
> 5 years	28 (25.7)	20 (71.4)	28 (100.0)	23 (82.1)	3 (10.7)	27 (96.4)
p value		0.716 <sup>2</sup>	0.383 <sup>2</sup>	0.510 <sup>2</sup>	1.000 <sup>2</sup>	0.028 <sup>2</sup>

<sup>1</sup> Chi-squared test; <sup>2</sup> Fisher's Exact test

Table 2. Bivariate analysis of respiratory problems according to harmful habits in prisoners with Tuberculosis. Fortaleza, Ceará, Brazil, 2017.

Variables	n (%)	Pale mucosa n= 76 (69.7%)	Cough n=105 (96.3%)	Sputum n=91 (83.5%)	Abnormal breathing pattern n=12 (11.0%)	Positive bacilloscopy n=93 (85.3)
<b>Smoking</b>						
Yes	70 (64.2)	47 (67.1)	68 (97.1)	62 (88.6)	7 (10.0)	60 (85.7)
No	39 (35.8)	29 (74.4)	37 (94.9)	29 (74.4)	5 (12.8)	33 (84.6)
p value		0.432 <sup>1</sup>	0.616 <sup>2</sup>	0.055 <sup>1</sup>	0.752 <sup>2</sup>	1.000 <sup>2</sup>
<b>Drinking</b>						
Yes	35 (32.1)	8 (22.9)	34 (97.1)	33 (94.3)	2 (5.7)	31 (88.6)
No	74 (67.9)	25 (33.8)	71 (95.9)	58 (78.4)	10 (13.5)	62 (83.8)
p value		0.246 <sup>1</sup>	1.000 <sup>2</sup>	<b>0.037<sup>1</sup></b>	0.331 <sup>2</sup>	0.510 <sup>1</sup>
<b>Use of illicit drugs</b>						
Yes	29 (26.6)	21 (72.4)	29 (100.0)	26 (89.7)	2 (6.9)	25 (86.2)
No	80 (73.4)	55 (68.8)	76 (95.0)	65 (81.3)	10 (12.5)	68 (85.0)
p value		0.713 <sup>1</sup>	0.572 <sup>2</sup>	0.389 <sup>2</sup>	0.510 <sup>2</sup>	1.000 <sup>2</sup>

<sup>1</sup> Chi-squared test; <sup>2</sup> Fisher's Exact test

## The Effect of Care Quality by Managing the Institute of Anatomy Pathology in Kosovo

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### Abstract

The management of the Institute of Pathological Anatomy in Kosovo is the only institution providing tertiary diagnostic services for the population of Kosovo. In the diagnosis and treatment of patients in the IPA, the priority is to manage the quality and accuracy of the diagnostic results. The IPA mission is to improve workflow management, reduce diagnostic errors, increase speed and diagnose quality. The purpose of this study is to identify the effect of quality of care diagnostic services in IPA and to assess to the management of IPA to change the factors that have affected the management of the institution so far. These factors relate to centralization, lack of autonomy, lack of financial resources for facility maintenance, lack of modern diagnostic equipment, lack of clinical specialties, lack of medical reagents, lack of clinical protocols. Bureaucratic hacks designed by health policy makers in Kosovo have influenced the progress of the IPA, so slowly to date. With a random sampling, 250 patients with different health problems (tumors) were recruited into the IPA for the period January 2018. The average age of participating subjects ( $n=250$ ) by random sampling was  $56.6 \pm 11.6$  years, where age group the youngest of patients ranging from 20 to 35 years old, which accounts for 6, 40% of the total number of patients diagnosed, the age group 36-50 is 32.80%, the age group of 51-65 years old 42% and the age group > 65 years old represents 18.80% of the total number of patients diagnosed in IPA. The abstract concludes with a list of evidences facing the public IPA in Kosovo. IPA's management role is a new approach, important to Kosovo and the health of its population. Increasing and timely provision of patient diagnosis is the achievement of institution management and the advancement of diagnostic quality of examinations in this institution. The evidence, that collaboration between IPA's internal and external clinicians and the use of advanced technology will significantly increase the patient's diagnostic activity. Finding outcomes will have a theoretical and practical impact on improving IPA work by recommending a research with some key findings for IPA management.

**Keywords:** Kosovo, anatomy, pathology, management, diagnostic services, clinical practices

### Introductions

Management of patient diagnosis methods and processes according to their morbidity is one of the challenges of pathologists of the Institution of Pathological Anatomy in Kosovo. In a country like Kosovo, with scarce health investments, the need to manage available IPA sources is urgent to advance the quality of timely diagnosis of patients, as this is the only diagnostic institution that plays an important role in preventing and treatment of cancer diseases in Kosovo. As the tumor diseases in Kosovo in the post-war period are increasing as a result of many factors, the role of IPA management plays a major role in the diagnosis of examinations. Laboratory memory for pathologists covers all aspects of the administration of the pathological and anatomical laboratory. In a practical approach, this abstract will provide basic principles and management tools for the practice of pathology and laboratory medicine. The Institute of Anatomy Pathology, in Pristina, is the unique institution of Kosovo that provides services to all citizens of Kosovo while trying to use contemporary methods of the examinative and diagnostic clinic. IPA is the only one public institution of tertiary level in Kosovo that provides diagnostic services for the entire population of Kosovo. Histopathological, immunohistochemical, histochemical, cytological, and clinical autopsy are performed at this institution. In the diagnosis and treatment of patients the priority of the work is the quality and accuracy of histopathological results. This process is achieved through the incorporation of the quality system, the management of laboratory personnel, the use of advanced technology, the management of interprofessional cooperation. Possible diagnostic advantages in IPA, Pristina include (i) providing earlier and more accurate diagnostic methods; (ii) providing accurate information about the disease that will decide on the

treatment of the patient; (iii) improving further treatment in patients; (iv) reducing the occurrence of side effects by unnecessary treatments; (v) providing the best tools for diagnosis; (vi) patient monitoring; (vii) improving patient outcomes.

## **The First Chapter**

### **Institute of Pathological Anatomy (IPA) in Kosovo**

At the IPA institution currently work about 40 employees as general staff and the rest are categorized according to health specialties, out of which 22 are pathologist's specialists, 1 specialist cytologists, 10 specialized midwifery specialists, 5 specialists, 2 administrators. Anatomopathologists at IPA in Pristina are the only diagnostic doctors in Kosovo that provide critical information and consultation on patient health problems, such as counseling on patient diagnostic testing, tracking test results for a patient's treatment and treating patient, and so on. Despite the roles that laboratory medicine, anatomical pathology and medical image play in diagnosis, anatomopathologists are not considered supportive services. Laboratory Association experts pIPAnt out that anatomopathologists are not adequately engaged in the diagnostic process and that better co-operation is needed between all members of their diagnostic and medical team (Allen and Thoraarth, 2014; Kroft, 2014). IPA should facilitate and support co-operation between doctors and clinicians in Kosovo for diagnosing and treating patients in time. This collaboration manages the entire testing process, including delegating the order for testing, analysis, interpretation, reporting, communication of results, and making subsequent patient decisions.

## **The Second Chapter**

### **The Laboratory (IPA) diagnostic activities**

Over a year at the IPA, there are about 12,000 biopsy examinations of various specialties, where approximately 50% of them are examinations of tumor pathologies. Immunohistochemical examinations are carried out in this institution. Being the only tertiary and unique diagnostic center for Kosovo, the institution manages all the difficult consultations that come from the regions and municipalities of Kosovo. The institution is a reference pIPAnt for all doctors in Kosovo. IPA analyzes come institutionally through various clinics and health institutions in Kosovo. There are cases when patients appear on an individual route at the IPA. The IPA institutionally collaborates with seven regional hospitals of Kosovo, namely Peja Hospital, Prizren Hospital, Mitrovica Hospital, Gjilan Hospital, Vushtrri Hospital, and Gjakova Hospital. It is worth mentioning that IPA institutional cooperation has and with private clinics in Kosovo. Each year about 12,500 patients are screened for histopathological, immunohistochemical, cytological and clinical autopsy tests. In IPA, in Prishtina, due to the management and dependence of this institution from UCCK and the Ministry of Health, there are some important factors that affect the daily work and management of IPA activity. Some of the factors that have hampered and continue to hamper qualitative and quantitative work in the IPA are related to (i) the bureaucracy highlighted by policymaking structures in Kosovo; (ii) centralizing the IPA; (iii) lack of financial support; (iv) lack of modern diagnostic equipment; (v) lack of clinical specialties; (vi) lack of timely supply of medical reagents; (vii) lack of coordination and cooperation of work with other institutions outside of Kosovo; (ix) lack of facility and infrastructure maintenance.

## **The Third Chapter**

### **Research Methodology**

The conduction of the survey took place during January - March of 2018. With a random sampling, 250 patients were diagnosed at the IPA Institution in Prishtina. The average age of the participating subjects was  $56.6 \pm 11.6$  years. The youngest age group of 20-35 years old accounts for 6.40% of the total number of patients diagnosed, the age group 36-50 is 32.80%, age group 51-65 years 42% and age group > 65 years 18.80% of the total number of patients diagnosed in IPA. In primary school there were (n=81 or 32.40%), with high school (n=118 or 47.20%), faculty (n=37 or 14.80%) and postgraduate studies (n=14 or 5.60%). Of the rural settlements were (n=154 or 62%), of urban settlements (n=96 or 38%) of diagnosed patients. Employed, (n=176 or 70.40%) of patients, unemployed (n=30 or 12%) and retired (n=44 or 7.60%).

The distribution of patients diagnosed and treated with medication according to the duration of the disease from their diagnosis results from 1 to 5 years (n=140 or 56%), 6-10 years (n=45 or 18%) of 11-15 years (n=49 or 19.6%) and with a duration of 16-20 years (n=16 or 6.4%) patients. From the results of the disease we come to the conclusion that we have the existence of an increased incidence of cancer in Kosovo. This is worrying and critical for the life of the Kosovo population, but alarming to find the factors that have affected it. For this, the factors for spreading tumor diseases in Kosovo should be studied. Clinicians and doctors have to worry and increase the education of the population through the promotion

of public health. Since timely disease prevention and early-stage testing will significantly reduce the risk to the patient's life. Collaboration with specialist doctors and family centers should be among the working criteria of doctors of the diagnostic laboratory for cancer disease in Pristina. This indicator paves the way for organizing work in the IPA, installing the digital medical technology at IPA for the first time. The registration of morbidity in electronic records would create a database of morbidity data that would be accurate and would process morbidity data more quickly, more accurately, more easily, reliably and errorlessly. This will create an electronic register according to the incidence of the disease, its prevalence for the first time, domestically for the Republic of Kosovo. The use of tumor drugs for this category of patients would be an indication of the degree of disease distribution in rural areas of Kosovo. Collaboration between levels of health care should be more present in cases of these diseases in order to reduce the illness timely prevention.

## Results

Outcomes regarding the question of how long the subjects were expected to receive the response to their diagnosis responded that (n=28 or 11.20%) received the score within a week. While, (n=54 or 21.60%) of IPA out that their score has been ready for two weeks. While a set of subjects (n=69 or 27.6%) have resulted that their response has been ready for three weeks. While a group of subjects of (n=84 or 33.6%) resulted that the response to their examination was obtained after a month of sample testing. We conclude that the time of one month (n=84 or 33.60%) of the interviewed subjects is a very long period of receipt of the response from the patient diagnosed with tumor disease.

The delay in receiving the response from the patient seems to be related to some internal and external IPA management phases. Delaying factors are inter-institutional interaction factors as a considerable number of tests are referred to outside the Laboratory with delays in submitting and completing the relevant documentation. Another factor is the use of devices already consumed in the IPA, which requires their replacement with the newest advanced technology. Another factor is the lack of reagents for certain and difficult examinations. Regarding the question of how subjects / patients are referenced in IPA, we conclude that (n=163 or 65.2%) of them are referred by a specialist (oncologist) or other specialty to carry out this examination. While (n=87 or 34.8%) of them have been referred to by another hospital of Kosovo municipalities.) In our case, two UCCK and Peja hospital have been selected. a high variation and referral of paclitaxes is an indicator that reflects the reality of unique cancer screening in Kosovo's health care since the IPA is the only tumor diagnostic center in the country.

As such, health actors should look at the possibility of timely transportation with appropriate tools, investing in equipment for the ubiquitous progression of IPA diagnostic procedures. When asked whether they have received the right information for the diagnosis of their illness, the responses provided reflect that their (n=98 or 39.2%) have knowledge of the diagnosis of their illness. While (n=79 or 31.6%) of the samples have no knowledge of the diagnosis of their disease. While (n=37 or 14.8%) of patients very little knows about their illness and only (n=36 or 14.40%) are waiting for a response from a specialist doctor. The results of the aforementioned question tell us that very little information is provided by patients about tumor illnesses, perhaps still in Kosovo is a taboo open patient talk to inform and inform him and his family about the condition of the patient, the risks of the disease and everything else that is related to the progress of the disease, as by assessing the rights-based card (WHO, 2008), all patients enjoy the right to information about their disease. It is therefore a duty of specialist doctors and clinicians to talk openly with their patients by informing them of the morbidity and its subsequent consequences.

As to how many doctors have provided explanations about the disease, how clear they were in their explanations, how understandable why this patient diagnosed was required, the subjects responded that only (n=58 or 23.2%) and (n=76 or 30.4%) did not understand the information provided by the physician, (n=69 or 27.6%) had the impression that their physician was reserved and only (n=47 or 18.8%) of patients were told that they had talked to their relatives with their doctor because they were not in a state of health to understand the doctor. From the answers given, it is clear that in most cases doctors are not understood by the patients because they are emotionally burdened, the disease feels tired, and even more so that this is a very serious illness to be calmly welcomed by the subjects of the health institution.

The doctors themselves in most cases, considering some of the characteristics of the patient or the disease, respect the subject by accepting to communicate with their closest family members about the illness of their patients. Asked whether patients believed that they were adequately advised by IPA staff, our subjects responded that only (n=103 or 41.2%) are very satisfied by the IPA staff for communicating with them, whereas only (n=115 or 46%) of the participants were well advised by the staff and only a small number of samples of about (n=32 or 12.8%) of the subjects result to be somewhat

satisfied by the advice received from the IPA staff. From the results of this work we come to the conclusion that the professionalism, the way of treatment and communication by the IPA staff with its patients is at the right levels. Although we think it should be done in the communication section as the psychological severity of the patients is a difficult role for the clinician.

Looking at the IPA structure and structure, the lack of a social specialty doctor at IPA is supposed to be part of the organization. 81 subjects (IPA employees) are participants on the frequency and percentage of health care workers who are considered as inclusive in the outcome of the diagnostic test work, from where employee variables related to advancing the quality of diagnostic services is the cause of professional growth of employees; working conditions at the IAI institution; factors of improving the role of the IPA management; a factor influencing the advancement of quality is the use and investment in new professional innovations. In the answer to the question, where do you think the IPA staff should invest the laboratory manager for the professional growth of the IPA staff, the subjects (n=65 or 78.31%) think that the organization of onglPAng training is a staff request, while (n=12 or 14.46% of employees think that participation in scientific conferences at home and abroad is an investment that should be carried out by management in the future and (n=4 or 4.82%) of respondents think that inter-institutional co-operation are part of their professional growth.

These results should be seen as part of staff training management and professional growth, which are factors that enhance the patient's quality diagnostic advancement. When asked what they think should be different from working conditions in the Pristina laboratory, the subjects stated that (n=25 or 30.12%) of the subjects think that the current infrastructure in the IPA should change, while (n=19 or 22.89%) of the subjects said that the change of old equipment in the lab would change their working conditions. But not only does it change the conditions at work, but this factor also relates to the other elements of diagnostic quality that is quality, accuracy, speed, ease and timely result. While a subject of (n=23 or 27.71%) of participants think that financial support and autonomy of the Laboratory will change their working conditions in the future. In this result we have to emphasize that so far the IPA is budgeted with a historical budget by the Ministry of Health in dependence of UCKK. This dependence has created some shortcomings that have been highlighted and the presentation of work in the IPA. However, the responses received from our subjects reinforce the importance of the budget or financial management factor related to the granting of autonomy and the IPA being a unique institution in Kosovo.

While (n=8 or 9.64%) think they should change the co-operation they have with outside doctors, as delays in test results depend on the cooperation they have between them. Time, transport, lack of information, lack of a computerized on-line laboratory program among doctors, laboratory clinicians to regenerate patient data in real time creates a gap in the IAP diagnostic process. While only (n=6 or 7.23%) of the employee subjects think that the provision of laboratory reagents at the right time is what needs to be changed in terms of working conditions in the IPA.

The question of what the employees' subjects think is to improve their role in IPA management results from the responses given that only (n=14 or 16.87%) think that it should change the clinical work process, while (n=25 or 30.12%) think that staff training should change so the procedure followed so far is not enough and for this the employees disagree as they need more professional training. While (n=12 or 14.46%) think that the role of management should change with regard to consultations with the staff. There is dissatisfaction in this regard as staff believes that management needs to be consulted more often with them. While a sample of (n=7 or 8.43%) participants think that LAB autonomy should be finally determined as this will change the work process, the IPA mission and its self-financing will IPA delays and mistakes harm to the quality of the diagnostic service. While a group of (n=9 or 10.84%) of employee entities think that decision-making along with staff is important in good management of IAP. A group of (n=6 or 7.23%) and a sample of (n=8 or 9.64%) think that institutional support and the establishment of new standards in research and testing are part of the IPA management. For this, investment in time and work from the management of the institution in cooperation with its employees is needed.

When asked about what IPA employees are expecting new innovation from their management, responses and the analysis of the most important factors for them as the influencing variables in innovation or innovation for IPA, are expressed by the subjects that IPA investments are very important to change the look of IPA. With a sample (n=18 or 21.69%) of investment entities in new, modern and contemporary technology devices, but simultaneously with many auxiliary and qualitative factors in the work of the laboratory physician, is one of the novelties required.

Another entity comprised of (n=16 or 19.28%) think that investment in infrastructure is part of the new IPA management innovation, with investment in infrastructure our subjects imply maintaining the current structure, painting it, change of doors, windows, main entrance gate to IPA, as the main door of the unique public diagnosis in Kosovo and so on. Also with

a subject of (n=18 or 21.69%), the samples emphasize the importance of cleanliness and maintaining the environment of their work in Kosovo's public institutions. Bearing in mind the aggravating factor of the psychological state of the patients who come to the IPA at the last stages of their life, the conditions of cleanliness, order, maintenance of the sitting room, regulated and clean rooms of the patients and the staff are the conditions minimum requirement that an institution such as the IAP should enjoy in Kosovo.

Another issue that has been seen as innovation in the IPAK is that the necessary supplies in time at the institution with this by the subjects (n=6 or 7.23%) have requested that there be no delays in supplies, planning management be carried out for a quantity the organization of public tenders should be a priority of the IPAK and be financed by the institution itself so as not to have any obstacles in the way that the status of reagents in IPA is not present. The new innovation is assessed by the subjects (n=14 or 16.87%) installing the new diagnostic technology at the IPA and only (n=9 or 10.84%) think that the innovation of change in the IPA management aspect is training modern-day staff on scientific research in diagnostics.

## Discussion

The high frequency of personnel attendance rates, which is characterized by the percentage of IPA employees who are inclusive in tumor diagnostics, IPA to several factors that need to change and which relate to their (i) growth factor; (ii) their working conditions; (iii) improving the management's role in programming purchases, financial budgeting, designing training programs, expanding scientific research, wider participation in scientific activities, etc. (iv) new innovations in employee work; (v) the use of contemporary equipment; (vi) comfortable environments for patients. The results of none of the aforementioned factors and the outcome of the IAP staff attitude are not behind the results of the study (Kavan M.G., 2014). The quality of laboratory care (Kavan, M.G., and E.J. Barone 2016) consists in the application of medical science and technology to find accurate patient diagnosis approach as well as to minimize diagnostic errors. The results show that IPA employees have already understood the importance and value of their diagnostic work.

The timely and quality diagnostic service has become a priority for them, with the aim of achieving timely and error-free diagnosis, as they relate to a delicate work process for the Kosovo population. The quality of patient care is essentially determined by the quality of infrastructure (Seema Mehta, 2011), the quality of training, the personnel competencies and the efficiency of the healthcare system's operating systems is consistent with the findings of our results. In establishing a model of health management of diagnostic institutions, it is necessary to measure (Pai and Chary, 2012) (i) the quality of service provided to patients; (ii) their waiting time from the moment of sampling for diagnosis; (iii) the degree of diagnostic errors; (iv) timely treatment of the patient. The quality of diagnostic services is proved as the standard of a metered and evaluated service with other similar services that is accomplished when professionals are consistently qualified, cognitive and good user of diagnostic methods (Singh, H. 2013). Through our research we proposed to IPA management to review the possibility of employing a psychologist-sociologist, as a result of the hard work of clinicians in this institution.

## Conclusion

Opinions regarding the current management of the institution, various absences and problems or attitudes of patients about the quality of the diagnoses they have received from this institution are the indicators of the IPA management role and its impact on the advancement of quality in diagnosis since (i) management plays an important role in patient outcome and diagnosis, in the quality of examinations and in the progress of the entire IPA process; (ii) there is a link between the institution's management and the professionalism of clinicians, their ongoing education, participation in scientific conferences on the very nature of professional and research work carried out at the IPA; (iii) there is room for improvement; (iv) the higher the use of modern technology, the longer the waiting time for the patient, the time of sample processing, and the quality of the diagnosis as well as the speed of patient treatment decrease. An effort to improve the functional aspect of IPA puts all responsible policy makers in Kosovo, for reviewing the Institution in the context of meeting its unique dimensions for the public diagnostic (IPA) health services in Kosovo.

## Bibliography

- [1] Berenson RA, Upadhyay DK, Kaye DR. Placing diagnosis errors on the policy agenda. Washington, DC: Urban Institute; 2014. May 22, 2015
- [2] Berwick DM. Postgraduate education of physicians: Professional self-regulation and external accountability. JAMA. 2015;313(18):1803–1804.

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- [3] Betsy Lehman Center for Patient Safety and Medical Error Reduction. The public's views on medical error in Massachusetts. Cambridge, MA: Harvard School of Public Health; 2014.
  - [4] Cahalan S. Brain on fire. New York: Simon & Schuster; 2012.
  - [5] Chassin MR, Baker DW. Aiming higher to enhance professionalism: Beyond accreditation and certification. *JAMA*. 2015;313(18):1795–1796.
  - [6] Croskerry P. The importance of cognitive errors in diagnosis and strategies to minimize them. *Academic Medicine*. 2003;78(8):775–780.
  - [7] Croskerry P. Perspectives on diagnostic failure and patient safety. *Healthcare Quarterly*. 2012 April;15(Special issue):50–56.
  - [8] Dwyer J. An infection, unnoticed, turns unstoppable. *The New York Times*. 2012 July 11; December 5, 2014
  - [9] Gandhi TK, Kachalia A, Thomas EJ, Puopolo AL, Yoon C, Brennan TA, Studdert DM. Missed and delayed diagnoses in the ambulatory setting: A study of closed malpractice claims. *Annals of Internal Medicine*. 2006;145(7):488–496.
  - [10] Gawande A. Being mortal: Medicine and what matters in the end. New York: Metropolitan Books; 2014.
  - [11] Genzlinger N. A medical guessing game, with life as the ultimate prize. *The New York Times*. 2012 June 24
  - [12] Golodner L. How the public perceives patient safety. Newsletter of the National Patient Safety Foundation. 1997;1(1):1–4.
  - [13] Graber ML, Franklin N, Gordon R. Diagnostic error in internal medicine. *Archives of Internal Medicine*. 2005;165(13):1493–1499.
  - [14] Haskell HW. What's in a story? Lessons from patients who have suffered diagnostic failure. *Diagnosis*. 2014;1(1):53–54
  - [15] Hazen EP, McDougle CJ, Volkmar FR. Changes in the diagnostic criteria for autism in DSM-5: Controversies and concerns. *Journal of Clinical Psychiatry*. 2013;74(7):739–740.
  - [16] Holmboe ES, Durning SJ. Assessing clinical reasoning: Moving from in vitro to in vivo. *Diagnosis*. 2014;1(1):111–117. IOM (Institute of Medicine). To err is human: Building a safer health system. Washington, DC: National Academy Press; 2000.
  - [17] Isabel Healthcare. Misdiagnosis is an overlooked and growing patient safety issue and core mission of isabel healthcare. 2006.
  - [18] Josiah Macy Jr. Foundation and Carnegie Foundation for the Advancement of Teaching. Educating nurses and physicians: Towards new horizons. New York: Josiah Macy Jr. Foundation; 2010.
  - [19] Julavits H. Diagnose this! How to be your own best doctor. *Harper's Magazine*. 2014 April;:25–35.
  - [20] Kavan MG, Barone EJ. Grief and major depression—Controversy over changes in DSM-5 diagnostic criteria. *American Family Physician*. 2014;90(10):690–694
  - [21] Madara JL, Burkhardt J. Professionalism, self-regulation, and motivation: How did health care get this so wrong? *JAMA*. 2015;313(18):1793–1794.
  - [22] Mechanic M. Atul Gawande: “We have medicalized aging, and that experiment is failing us.” *Mother Jones*. 2014
  - [23] Newman-Toker D, Pronovost PJ. Diagnostic errors: The next frontier for patient safety. *JAMA*. 2009;301(10):1060–1062.
  - [24] Schiff GD, Leape LL. Commentary: How can we make diagnosis safer? *Academic Medicine*. 2012;87(2):135–138.
  - [25] Schiff GD, Kim S, Abrams R, Cosby K, Lambert B, Elstein AS, Hasler S, Krosnjak N, Odwazny R, Wisniewski MF, McNutt RA. Advances in patient safety: From research to implementation (Volume 2: Concepts and methodology).
  - [26] Henriksen K, Battles JB, Marks ES, Lewin DI, editors. Rockville, MD: Agency for Healthcare Research and Quality; 2005. pp. 255–278. (Diagnosing diagnosis errors: Lessons from a multi-institutional collaborative project). AHRQ Publication No: 05-0021
  - [27] Singh H. Diagnostic errors: Moving beyond “no respect” and getting ready for prime time. *BMJ Quality & Safety*. 2013;22(10):789–792.

## Identity Narrative as an Unconscious Scaffold for Human Autobiography

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### Abstract

Over the past years, a multi-disciplinary literature on the significance of personal narratives in autobiography and identity has emerged. This subject has been of interest to authors in the fields of humanities, psychology, and medicine alike. In this paper, we are proposing the term Identity Narrative (IdN) to define a cognitive and emotional framework that serves as an implicit (unconscious) scaffolding of memory on which to build human autobiography. The authors first classify narratives into external (universal history, the humanities, culture) and internal (autobiography, based on personal experiences, both directly and indirectly, through identification and education). All philosophy and social commentary has utilized history for the purposes of prediction and meaning-making. Personalities including Aristotle, St. Augustine, Rousseau, Freud, Marx, Spengler, and Benjamin Franklin have reread history to gain insight about human nature. History has inspired the enlightenment and renaissance of a new reality for humanity. It is widely known that history can also be misused to justify aggression and human suffering. The use of history to create deep convictions that annihilate moral imperatives is only possible because of unconsciously consolidated internal narratives, the IdN. IdN is reshaped through life, both by "bottom-up" acquisition of information, as well as a "top-down" learning model, which includes the following circumstances: (a) sudden insight and awareness; (b) experiences with high emotional valence; (c) high frequency of repetition; and (d) prolonged duration of exposure. In this way, IdN, a form of relatively stable unconscious, anoetic memory, provides a "first-person" experience to autobiography. Autobiography then, becomes part of auto-noetic consciousness, the human ability to mentally time travel and have self-knowledge. IdN parallels lifelong growth and development, language acquisition, and maturing of attachment. The extensive brain activation during communication and speech, revealed by neuroimaging studies, will be referred to as the "communication beltway." We hypothesize that the alternation in activation between the default mode (midline structures) of the brain (previously associated with the Self) and the language brain creates a platform that encodes crucial components of IdN throughout life. In this way, IdN, autobiographical memory, and the language brain are parts of a larger biological substrate of social affiliations.

**Keywords:** identity narrative, unconscious, scaffold, human, autobiography

## Introduction: Narrative Identity and Identity Narrative (IdN)

Human consciousness is linked to our capacity to keep history. Our ability and need to keep a timeline between past, present, and future necessitates the creation of stories and human history<sup>1</sup>. Indeed, human history starts with telling of stories and fairytales. In some languages the word for the field of history and the word for story are interchangeable ["Geschichte" (Ger.), "L'histoire" (Fr.)]. Through stories, all cultures provide a narrative for the origin of the world (Eliade, 1998).

The word Narrative comes from "gna" (Sanskrit) meaning knowledge, "gnarus" (Latin) and "narrare" (Latin) meaning to tell (Abbott, 2002).<sup>[1]</sup> Contributions over the past century have pointed to the significance of a person's narrative in creating a cohesive personal history. The term *Narrative identity* is commonly associated with the work of French philosopher, Paul Ricoeur, referring to the life story that an individual develops consciously by creating an integration of life events into a coherent narrative. In more clinical contexts, narrative identity is a part of a conscious autobiographical integration of life events. We are proposing the new term "Identity Narrative" ("IdN") to refer to an implicit unconscious type of memory that serves as support for identity and the self.

## Identity Narrative and Autobiographical Memory

Squire (1995) distinguished between declarative (conscious recollection) and non-declarative (without conscious sense of "pastness") memory. Non-declarative, or implicit memory, has been traditionally associated with "habit" or procedural, automatic tasks. Tulving's contributions (1972, 2002) on memory have delineated the differences between declarative semantic memories (facts) and declarative episodic memories (events). A subtype of episodic memories is the autobiographical memory (AM). Autobiographical memory gradually develops during preschool years. There is a large body of developmental, clinical, and theoretical literature on AM. Autobiographical memory is seen as a quintessential attribute that provides identity to a person. However, from a neurobiological point of view, AM as a subtype of memory of personal events alone, could hardly fulfill its function of maintaining personality stability and predictability. Curiously, little has been written about the role of procedural memory in maintaining personality stability.

We propose that Identity Narrative ("IdN"), as a dimension of procedural memory, a form of the unconscious, consists of encoded information of a variety of origins, which are gradually retained as implicit (procedural) memories. IdN provides AM with implicitly encoded, predictable patterns of reactions to the environment which first develop in a dyadic relationship with caregivers. IdN is most actively developed during the preschool years, beginning with the time of the childhood amnesia but continues to expand and reshape throughout life.

We propose that IdN is a contemporary form of the unconscious. Seen in this context, the unconscious has a very specific evolutionary role. As a form of procedural memory linked to autobiography, it allows for the "anoetic" consciousness, which creates a profound and constant presence of "who we are." IdN creates an early narrative, "a way of being," rather than "a way of remembering." "A way of being" is created by parental interactions, attachment, cultural environments, and life experience. In addition, temperamental factors and epigenetics may have a significant role in shaping IdN (Novac et al, 2017).

Thus seen in this context, the unconscious is charged with background constancy that, for better or for worse, provides an intergenerational and culturally cohesive role. This is supported by evidence that life-events, especially interactive experiences from ages 0 to 3, which an individual has no explicit memory of, are stored and influence a person's development and future personality (Kernberg, 2015). Unlike pure autobiography and self-awareness, IdN, as part of anoetic consciousness, is present in vertebrate animals (Panksepp, 1998).

<sup>1</sup> Keeping a timeline is specific to auto-noetic consciousness of Homo sapiens sapiens (Leffert, 2018).

In humans, IdN stores a set of implicit memories prior to the emergence of autobiographical memory during ages three to five. The early “uploads” of IdN components serve as a basic framework, a permanent unconscious scaffolding for the further acquisition of autobiographical memories and the conscious autobiographical self. Throughout life, IdN continues to be reshaped by life events (Novac, Bota, & Blinder, 2017). There seems to be an ongoing reciprocal exchange between the unconscious IdN and AM. Previous work has indicated that the function of the “self” is associated with activation of midline brain structures (Panksepp & Northoff, 2009). In addition we have proposed the term “Communication beltway” for the extensive bilateral brain stimulation during interactive speech (Novac & Bota, 2014). We have hypothesized that the alternation in activation between the default mode (midline structures) of the brain and the “Communication beltway” creates a neurobiological platform that encodes crucial components of IdN throughout life. In a previous contribution, we also proposed that throughout life, the reshaping of IdN occurs through a variety of mechanisms, depending on social circumstances: (a) sudden insight and awareness of a specific important life event and/or self-awareness (the “Eureka” moment); (b) any experiences with high emotional valence, as catecholamines secreted during emotional moments have a memory consolidating effect (McGaugh, 1983); (c) high frequency of repetition; and (d) prolonged duration of exposure (like the years spent in formalized education which shape identity) (Novac, Tuttle, Bota, Yau, & Blinder, 2017).

As IdN operates at an unconscious level, it encompasses a large number of functions, including: attachment, interactive restoration, acquisition of traits, reshaping of reactivity, etc. It also provides a stabilizing effect on autobiographical memory. In order to do so, it has to undergo a continuous *adaptive* process. Biologically, adaptation encompasses two separate components: *mutation* and *selection*. By means of mutation, new traits or structural components are created in time. These are all “developmental opportunities.” Through the process of selection, as time passes, only the most functionally useful “opportunities” are maintained. The unused components are gradually eliminated. Prior contributions that cover the unconscious hardly considered mutation and selection as active mechanisms. IdN, as a form of the unconscious memory, may undergo a continuous process of adaptation through active mutation and selection. This occurs through two major mechanisms: a “bottom-up” and “top-down.”

### A. The Bottom-Up Mechanism

Preverbally, IdN incorporates the previously described match/mismatch/repair paradigm during mother/infant interaction (Cavalzani & Tronick, 2016). This incorporation into the unconscious IdN mirrors the “predictive cycle” paradigm of procedural learning (Tadlock, 2005). This early implicit information becomes part of aneotic consciousness. Thus early acquisitions of IdN remain unconscious and are the basis of automatic associations and actions, with little access to awareness.

### B. The Top-Down Mechanism

After verbal acquisition, IdN also includes the acquisition of self-related skills (within the “acquisition of skills” paradigm of procedural learning) (Fitts, 1954), which is dominant throughout life. Through the “acquisition of skills” implicit (procedural) learning paradigm, newly acquired conscious, explicit memories of life events are incorporated into the unconscious, implicit memory pool, e.g. the IdN.

Functionally, the main role of IdN is the organization and holding of conscious autobiographical information. Its priority is autobiographical information-storage and retrieval in a *predictable and consistent* manner, to create stability of personality. It also allows for the storing of autobiography in the form of a meaningful “logical story,” a narrative. IdN provides a personal point of reference toward that narrative, common sense, and meaning for any story. Yet, IdN is unconscious.

IdN provides a variety of psychodynamic functions including defense mechanisms (against anxiety and panic). It facilitates attachment and thus allows for the expansion of personal development, social bonds, cohesion and communal kinship, which all promote survival.

Childhood amnesia, the first three to five years of life, for which most of people have little or no recollection, is the period during which IdN is formed and built through a gradual acquisition of implicit, experiential memories. Processes that occur during childhood amnesia do influence the emergence of autobiographical memory (Nelson & Fivush, 2004).

In a previous contribution (Novac, et al., 2017b), we proposed the coordinates of IdN and its functions in relation to childhood amnesia. While IdN (the unconscious) is anoetic, it makes the acquisition of the features of autobiography, and its auto-noetic conscious, possible: "Remembering that it happened to me," the auto-noetic experience (Tulving, 2002); the linking of past experiences to the present; the ability to "own" the changes in one's own self (McLean, Pasupathi, & Pals, 2007); the ability to create a personal timeline and observe an organized manner in creating a personal chronology (Habermas, 2007; Habermas & Bluck, 2000).<sup>1</sup>

### **The Relevance of Narrative Identity**

Phenomenologist, Paul Ricoeur's extensive contribution on "Narrative Identity" constitutes fundamental knowledge for the study of autobiography. Consciously, a stable life narrative identity seems to emerge around adolescence (McLean, 2005; McLean & Breen, 2009 ).

Narrative Identity research elicits personal narrative from subjects that code the stories in areas such as redemption, contamination, communion, agency, etc. (McAdams, D, 2001). The function of meaning-making is particularly valuable in psychological healing and trauma recovery (Pennebaker, 1993, 2000). Narrative Identity with its coherent memory of one's past is also crucial in the mechanism of constructing a coherent autobiography (Habermas & Bluck, 2000). In this sense, Narrative Identity is the organized conscious and functional component of a person's autobiography.

Paul Ricoeur pointed to the fact that humans tend to draw past events together into a meaningful narrative, a process he called "emplotment." To Ricoeur, attribution of causation, and explanation of one's personal past, stands as the basis for moral responsibility. Therefore, narrative and by implication, Narrative Identity, are parts of establishing a moral universe. In Ricoeur's analysis, Narrative Identity is closely linked to the concept of time. Ricoeur recognizes a "prenarrative level of understanding referred to as "prefiguration." He posits that the prenarrative level of understanding stems from the fact that an individual consciousness is inhabited by its culture as a "symbolic whole." (Ricoeur, 1975, 1978 1984, 1985, 1988). Regarding the future, "inchoate narrativity" integrates life events into potential narrative that creates a potential for action and decision-making. This creates a meaning for the future and the possibility of choice-making.

We are proposing the term Identity Narrative (IdN) to designate the implicit (unconscious) memory component that supports and creates a relative stability for conscious autobiographical narrative identity. In this sense, Narrative Identity and our new concept of IdN are distinct, yet closely linked.

### **Differences Between Narrative Identity and Identity Narrative (IdN)**

Here we are presenting a broad delineation of the difference between these two concepts.

Narrative Identity is one's consciously recalled and reprocessed life story: a part of autobiography. IdN is unconscious. There is evidence that its roots begin prenatally and develop before verbal acquisition.

Narrative Identity is structurally linked to time, cause and effect, and coherence. IdN tends to be timeless, may not follow cause and effect logic, and includes primary process thinking.

Narrative Identity has an ego-sustaining effect and explicitly defines the self in relation to others. It facilitates self-examination. IdN arises out of early dyadic relationships, evolutionarily meant to have reparative functions. It molds itself

<sup>1</sup> The timeline may be part of an implicit organization of IdN.

by virtue of the nature of infant-caregiver interactions. IdN is a form of the unconscious with an implicit record of interactive experiences. Alternatively, it may incorporate dysfunctional interactions which shape the developing self.

Narrative Identity also includes at a basic stage a “pre-narrative” level of understanding (“pre-figuration”) which stems from consciousness being inhabited by culture as a “symbolic whole.” IdN focuses entirely on a social, interactive “pre-narrative” aspect. It is unconscious and includes elaborate components with a role in non-verbal communication, trauma-reparative resiliency, and therefore, has a crucially stabilizing effect for autobiography. This has not been previously covered by the literature on narrative identity.

Narrative Identity is a human attribute related to the cultural environment. IdN is a neurobiological and clinical concept related to non-declarative (unconscious) memory and anoetic consciousness. It is present to different degrees in evolved animals. It is linked to the evolution of the brain.

Ricoeur's concept of “pre-narrative” presents many similar features to IdN. The “pre-narrative” and the IdN, with their underlying deep predisposition to grasping and acquisition of specific new information, both evoke Chomsky's “deep structure” for acquisition of human language (Chomsky, 1965)).

In conclusion, in our view, Narrative Identity is based on the inherent human drive to cultivate auto-noetic consciousness through narratives (stories), both on cultural and personal levels. IdN, with its early structuring function stemming from implicit memory consolidation, provides a relative stability to an individual's Narrative Identity and the autobiographical self. From a clinical point of view, the term autobiographical memory is preferred. From a philosophical point of view, identity is examined through Narrative Identity.

### **Narratives in Social Contexts**

We are proposing a classification of narratives into two types: External and Internal Narratives.<sup>[1]  
[SEP]</sup>

A) External Narratives (EN), the stories in society about people and places, which is history. The discipline of narrative inquiries, a qualitative type of analysis, is also related to EN. External Narratives, the recording of human history in all of its forms has emerged as an expression of auto-noetic (self-aware) consciousness, the ability and need to maintain a timeline between past, present, and future.

In the ancient world, Herodotus, the father of history, used biographical narratives, the stories of individual people, to reconstruct events (retroactively), thus creating history. Initially, narrative inquiry was used to also predict patterns. In the ancient world, predicting the patterns of the flooding of the river Nile, which created fertile soil, could predict the quality of crops. Nevertheless, the major role of history in society is its participation in both group identity and individual identity of its members. Today we still study history to understand the present and the future.

External narratives shape individual internal narratives in society. They are included and relied upon in many disciplines, such as literature, philosophy, ethics, and culture. The very purpose of having a universal culture and literature is based precisely on the natural need of humanity to have common denominating stories. Characters developed by William Shakespeare and Honoré de Balzac do not just portray segments of society as they saw them. Socrates' claim that “An unexamined life is not worth living” is based precisely on the ability to learn, assimilate and then re-route the contents of our examinations and the resultant moral lessons to implicit memory. Absent such examination, a fictive self may result. Goethe, Schiller, Victor Hugo, André Gide, and Marcel Proust have all created characters or provided insights about how we humans function internally.

External narrative can also create social cohesion under a variety of circumstances. The need of coherent meaning in a common story is also expressed in the spontaneous creation of narratives in groups when information about the future is not readily available. Rumors and gossip are spontaneous creations of a new reality. They are readily accepted as truth in order to fill in missing information about the present and future. Otherwise, such informational gaps can create uncertainties

about the future (Sunstein, 2009). Though often based on falsehood, gossip and rumor narratives create meaning that is vital in maintaining stable and trusting relationships in society (Novac, McEwan & Bota, 2014). So intense is the drive for creating meaning in relationship based on these narratives, that ethics and religions have imposed mandates and regulations to limit the potential damaging repercussions of unchecked narratives.

B) Internal Narratives (IN) refer to personal history Based on recorded or memorized personal experiences. Human personal experiences constitute our autobiographical memory. But humans (and in fact, all mammals) have the capacity to record events *beyond any full awareness* of the recall. It is this aspect of internal narratives that constitute Identity Narrative (IdN). Thus, internal narratives, "memories," are comprised of individual experiences, sometimes personal stories, which often are the building blocks of autobiographical memory (Novac 2013). Internal narratives include the unconscious IdN and the conscious autobiographical memory including narrative identity.

To the study of social events, both internal and external narratives are relevant. The ties between internally created narratives by group situations as shaped by historical events will influence, at any given time, the collective narrative of a group. Such a collective narrative is still the resulting effect of concomitant narrative reshaping of groups in society or an entire nation. Internal group narratives, the potentiation and playing of beliefs will influence voting in democracies. Certain factors, like commonly held beliefs, misperception or the presence of financial deprivations can unify internal narratives of groups or an entire nation. At crucial vulnerable moments in history, populist leaders can create a new, external narrative by finding a common enemy or a wide promise of deliverance.

This is a social phenomenon that is well known to political historians. When seen in the psychological context through which internal and external narratives become synchronized, it becomes easier to comprehend how irrational behavior and significant social shifts can be activated. It is the fact that the external narratives (e.g., history, politics), become linked to IdN and autobiography, which carry deeply ingrained survival mechanisms. The psychological energy, the drive attached to survival behavior, cannot be overemphasized. History has shown that such major political upheavals can rapidly escalate with grave consequences for world peace.

## Conclusions

In this paper, we have proposed the concept of Identity Narrative as an unconscious memory scaffolding for autobiographical memory. We are proposing that social phenomena be examined through the light of historical narratives of a nation or a group and their impact on autobiography of individuals.

## References

- [1] Cavelzani, A., & Tronick, E. (2016). Dyadically expanded states of consciousness and therapeutic change in the interaction between analyst and adult patient. *Psychoanalytic Dialogues* 26(5), 599-615.
- [2] Chomsky, N. (1965). *Aspects of the theory of syntax*. Cambridge: MIT Press.
- [3] Fitts, P. M. (1954). The information capacity of the human motor system in controlling the amplitude of movement. *Journal of Experimental Psychology*, 47, 381-391.
- [4] Habermas, T. (2007). How to tell a life: The development of the cultural concept of biography. *Journal of Cognition and Development*, 8, 1-31.
- [5] Habermas, T., & Bluck, S. (2000). Getting a life: The emergence of the life story in adolescence. *Psychological Bulletin*, 126, 748-769.
- [6] Kernberg, O. F. (2015). Neurobiological correlates of object relations theory: The relationship between neurobiological and psychodynamic development. *International Forum of Psychoanalysis*, 24(1).
- [7] McAdams, D. (2001). When bad things turn good and good things turn bad: Sequences of redemption and contamination in life narrative and their relation to psychosocial adaptation in midlife adults and in students. *Personality and Social Psychology Bulletin*. 27 (4): 474-485.
- [8] McLean, K. (2005). Late adolescent identity development: Narrative meaning making and memory telling. *Developmental Psychology*, 41(4), 683-691.

- 
- [9] McLean, K. C. & Breen, A. V. (2009). Processes and content of narrative identity development in adolescence: Gender and well-being. *Developmental Psychology*, 45(3), 702–710
  - [10] McGaugh, J. L. (1983). Preserving the presence of the past. Hormonal influence on memory storage. *Am Psychologists*, 39, 161-173.
  - [11] McLean, K. C., Pasupathi, M., & Pals, J. (2007). Selves creating stories creating selves: A process model of self-development. *Personality and Social Psychology Review*, 11, 262–278.
  - [12] Nelson, K., & Fivush, R. (2004). The emergence of autobiographical memory: A social cultural developmental theory. *Psychological Review* 2, 486-511.
  - [13] Novac, A. (2013). Narrative and healing processes during psychotherapy: The reloading and implicit relegation hypothesis. *Academy Forum*, 57(2), 22-24.
  - [14] Novac, A., & Bota, R. (2014). Transprocessing: A proposed neurobiological mechanism of psychotherapeutic processing. *Mental Illness*, 6(5077), 20-36.
  - [15] Novac, A., McEwan, J. D., & Bota, R. G. (2014). Negative rumor: Contagion of a psychiatric department. *Primary Care Companion for CNS Disorders*, 16(2).
  - [16] Novac, A., Bota, R. G., & Blinder, B. (2017). Identity narrative density: Preliminary findings from scoring emotional valence of autobiographical events. *Bulletin of the Menninger Clinic*, 81(4), 299-313.
  - [17] Novac, A., Tuttle, C. D., Bota, R., Yau, J. B., & Blinder, B. J. (2017). Identity and autobiographical narratives: Towards an integrated concept of personal history in psychiatry. *Mental Health and Family Medicine*, 13, 625-636.
  - [18] Panksepp J. (1998a). *Affective Neuroscience: The foundation of animal and human emotions*. New York, Oxford University Press.
  - [19] Panksepp J., & Northoff G. (2009). The trans-species core self: The emergence of active cultural and neuro-ecologic agents through self-related processing within subcortical-cortical midline networks. *Consciousness and Cognition*, 18, 193-21.
  - [20] Pennebaker, J. W. (1993). Putting stress into words: health, linguistic and therapeutic implications. *Behav Res Ther* 31(6):536-48
  - [21] Pennebaker, J.W. (2000). "Telling stories: The health benefits of narrative". *Literature and Medicine*. **19**: 3–18
  - [22] Recoeur, P. (1975, 1978). *The rule of metaphor: Multi-disciplinary studies of the creation of meaning in language*, trans. Robert Czerny with Kathleen McLaughlin and John Costello. London. Routledge and Kegan. [check/confirm/validate this reference]
  - [23] Recoeur, P. (1984, 1985, 1988). *Time and Narrative*, 3 vols. Trans. Kathleen McLaughlin and David Pellauer. Chicago: University of Chicago Press.
  - [24] Tadlock, D. (2005). *Read right! Coaching your child to excellence in reading*. New York: McGraw Hill.
  - [25] Tulving, E. (2002). Episodic memory: From mind to brain. *Annual Review of Psychology*, 53, 1–25.

## Impact of Human Settlement on Land Use/Land Cover Changes in the Middle River Njoro Sub Watershed in Kenya

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### Abstract

This study investigated the use of remote sensing and GIS in evaluating the impacts of human settlement on land use /Land cover changes. The study also investigated the drivers behind the change in the middle of River Njoro sub watershed for a period of 27 years. Drivers of land use change were captured by the use of DPSIR model where Drivers (D) represented human needs, Pressures (P), human activities, State (S), the ecosystem, Impact (I) services from the ecosystem and Response (R), the decisions taken by land users. Land sat MSS and Land sat ETM+ (path 185, row 31) were used in this study. The Land sat ETM+ image (June 1987, May, 2000 and July, 2014) was downloaded from USGS Earth Resources Observation Systems data website. Remote sensing image processing was performed by using ERDAS Imagine 9.1. Three land use/land cover (LULC) classes were established as Human settlement, forest and shrub land. Severe land cover changes was found to have occurred from 1987-2000, where human settlement increased by 52%, shrub land reduced by 19%, and forestry reduced by 72%. In the year 2000 – 2014, human settlement increased by 121%, shrub land reduced by 45%, and forestry reduced by 64%. Forestry and shrub land were found to be consistently reducing while human settlement was increasing. It was evident from the images that the LULC changes with corresponding soil quality deterioration mostly occurred in the upper and middle parts of the Middle river Njoro sub watershed which were initially under forest. To minimize the risk of vegetation destruction and soil degradation, it will be necessary to identify socioeconomic safety nets and initiate restoration of the environment to original pre- catastrophe status.

**Keywords:** watershed. Land use/land cover change, Landsat imagery, Geographic Information System

### Introduction

Settlement can be observed directly in the field or by remote sensing. Information collected on land use in form of settlement require the integration of natural and social scientific methods (expert knowledge, interviews with land managers) to determine which human activities resulting from settlements that are occurring in different parts of the landscape. As a result, scientific investigation of the causes and consequences of land use/land cover change (LULCC) requires an interdisciplinary approach integrating both natural and social scientific methods, which has emerged as the new discipline of land-change science. Land use /Land cover (LULC) is continuously changing in the Middle River Njoro ecosystem, thereby threatening sustainability and livelihood systems of the people.

Human population increase is causing great pressure to the natural environment resulting in increasing conflict between different human activities and the need for biodiversity conservation. Settlements and other biodiversity modifications have resulted in deforestation, biodiversity loss, global warming and increase of natural disaster like flooding (Fan *et al*, 2007, Dwivedi, *et al*, 2005). Land use/land cover change in most or all cases is associated with environmental problems. Therefore, available data on LULC changes can provide critical input to decision-making of environmental management and planning the future (Fan, *et al*, 2010, Prenzel, 2004).

The growing population and increasing socio-economic necessities creates a pressure on land use/land cover. This pressure results in unplanned and uncontrolled changes in LULC (Seto, *et al*, 2002). The LULCC alterations or change in the state of the ecosystem are generally driven by pressures resulting from mismanagement of agricultural, urban, and forest lands which lead to severe environmental impacts such as landslides that require a response to abate disaster.

The driver's – pressure – state – impact - response (DPSIR) framework is a causal chain where the driving forces of LULCC consist of any natural (biophysical) or human-induced (socio-economic) factors like settlement that can lead to environmental pressures. The demand for agricultural land, energy, water, food, transport and housing can serve as

examples of driving forces (Giupponi, 2002; Kristensen, 2004; Wood and van Halsema, 2008). Pressures consist of the driving forces' consequences on the environment such as the exploitation of resources (land, water, minerals, fuels, etc.), pollution and the production of waste or noise (Wood and van Halsema, 2008). As a result of pressures, the 'state' of the environment is affected; that is, the quality of the various natural resources (air, water, soil, etc.) in relation to the functions that these resources fulfill. The 'state of the environment' is thus the combination of the physical, chemical and biological conditions. The support of human and non-human life as well as the depletion of resources can serve as pertinent examples (Kristensen, 2004).

Changes in the state may have an impact on human health, ecosystems, biodiversity, amenity value and financial value. Impact may be expressed in terms of the level of environmental harm and finally, the responses demonstrate the social efforts to solve the problems identified by the assessed impacts, e.g. policy measures, and planning actions (EEA, 1999; Giupponi, 2002; Kristensen, 2004; Wood and van Halsema, 2008).

To date, DPSIR has been proved as a valuable tool that describes the relationships between the origins and consequences of environmental problems (Leka *et al.*, 2005), it provides a significant fraction of the necessary environmental information (EUROSTAT, 1999), it facilitates decision making (Tschemning *et al.*, 2012) and promotes the core essence of environmental sustainability (Reed *et al.*, 2006). As a result, it has been applied in numerous research efforts including Water Resources Management of various scales as well as in a series of international and multidisciplinary research projects as the main analysis tool (Tschemning *et al.*, 2012).

The middle River Njoro sub Watershed has been undergoing a new phase of rapid land use change to accommodate the increasing rural and urban human settlements. There is therefore need to understand how land use changes affected the environmental sustainability of the study area. This study was therefore aimed at establishing the impact of human settlement on land cover/land use change and its influence on land use decisions in the middle River Njoro sub watershed.

### Study Area

Njoro town is located in Nakuru County on the eastern edge of the Mau Forest Complex, the largest single forest blocks in Kenya. The area lies between the forest and Lake Nakuru National Park, a world famous flamingo habitat. The greater Nakuru District is situated between 35° 28' – 35° 36' E longitude and 0° 13' – 1°10' S latitude.

Most of the new settlers were originally pastoralists but are now practicing agro-pastoralists or keeping animals and practising crop farming. In addition to farming, they are using cleared forest areas for grazing livestock, mainly cattle, sheep and donkeys.

Besides subsistence farming, these farmers also keep dairy animals and grow wheat as a cash crop. Smaller farms are interspersed with a few remaining large scale farms from the colonial era, including Egerton University's Ngongogeri commercial farm. Urban centres in the middle zone include Njokerio which is around Egerton University Campus and Njoro Township.

The area of study covers about 8,170 Ha and lies between latitudes 0° 15' S and 0° 25' S and longitudes of 35° 50' E and 36° 00' E (Figure 1). The whole watershed has a population of about three hundred thousand (300,000) people with more than three thousand (3000) individual farm holding units (Baldyga, *et al.*, 2003).

However, according to Kenya National Bureau of Statistics, Njoro Sub County registered a population of 23,551 people having grown by 3% from a population of 22,845 people in 1999 (KNBS, 2009). Based on the same growth rate, the watershed population may have also grown to 309,000 people with may be 3100 households. Due to the heavy settlement in the middle watershed, it is estimated to be home to about 2000 farm holding units in an area of more than 8,000 hectares with slopes ranging from < 2 to > and soils that are predominantly volcanic clay loam except near the lake where silt clay dominates (Mainuri and Owino, 2013).

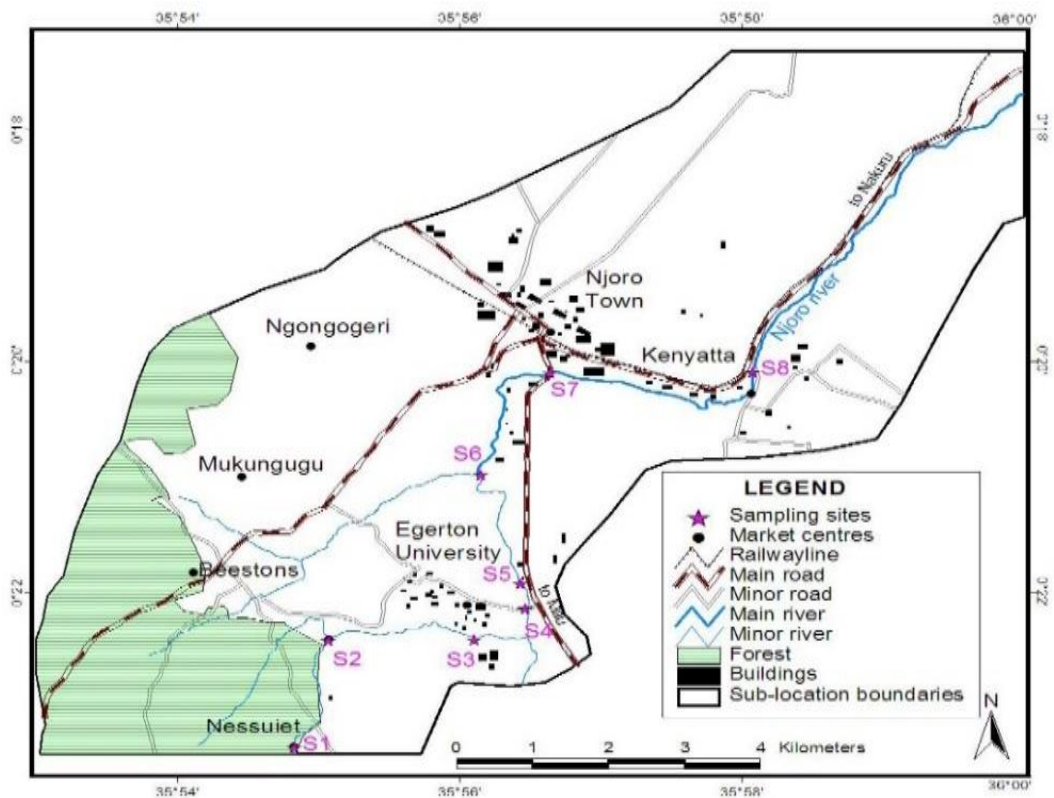


Figure 1: Middle River Njoro Watershed (Source: Mainuri and Owino, 2014)

### 3.0 Methods

A baseline survey at household-level encompassing socio-economic changes and impacts of land use activities in the middle River Njoro Watershed was established. Additionally, information on factors influencing land use decisions, productivity factors and change in economic activities were sought through use of a questionnaire. The middle River Njoro sub watershed household survey was to target an area of approximately 8000 hectares. Three Landsat scenes were selected (1987, 2000 and 2014) for this study. These dates captured the major excision and settlement changes that have taken place in the watershed. Effort was made to acquire imagery that corresponds with major land use/land cover changes within this period.

The study utilized 200 questionnaires which were administered to homesteads that were initially identified at random on both sides of the river. The questionnaires were subjected to scrutiny for completeness and consistency in question answering and the way they addressed the various issues intended to be captured. The questionnaires were sorted out and entered into the SPSS (version 20) work sheet. With the descriptive and categorical nature of most of the questions, simple descriptive analysis was done using SPSS and inferential statistics performed based on the results.

#### 3.1. Land use field data

Data on the driving factors that influence land use decisions in the Middle River Njoro sub watershed drainage basin was gathered through semi-structured interviews with the farmers (land owners) and six (6) key informants selected at random based on their areas of operation including an agriculturist, environmentalist, social economist and NGOs in the region. Local group officials such as self-help groups, Friends of River Njoro and Water Resource Users Association (WRUA), were also interviewed concerning land use history and the perceived processes driving land use in the area.

### 3.2 Image classification

Land sat MSS and Land sat ETM+ (path 185, row 31) were used in this study. The Land sat ETM+ images (June 1987, May, 2000 and July, 2014) were downloaded from USGS Earth Resources Observation Systems data. The dates of both images were chosen to be as closely as possible in the same vegetation season. All visible and infrared bands were included in the analysis. Remote sensing image processing was performed using ERDAS Imagine 9.1. Five LULC classes were established as commercial farms, forest, settlement, subsistence farms, and shrub land. Three dated Land sat images (1987, 2000, and 2014) were compared using supervised classification technique. In the supervised classification technique, three images with different dates were independently classified. A Supervised classification method was carried out using training areas. Maximum Likelihood Algorithm was employed to detect the land cover types in ERDAS Imagine 9.1.

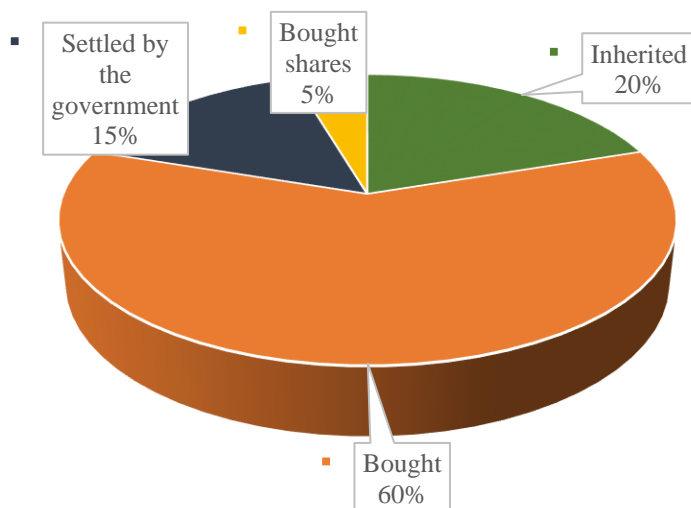
### 3.3. Analysis of the Driving Forces of Land Use using DPSIR model

The DPSIR conceptual framework is a causal chain consisting of five elements; **Drivers** (human needs), **Pressures** (human activities), **State** (the ecosystem), **Impact** (services) and **Response** (decisions) which was used as a means to organize the many social, economic and ecological interactions in the sub watershed. Assessment of driving forces behind land use/land cover change (LULCC) was done to capture past patterns and also be able to forecast future patterns. Driving forces on LULCC captured in the survey included most of the factors that influenced human activity, including population increase, poverty, land tenure and markets. Also other underlying factors like local culture, food preference were found to influence the decisions made. Economics or the demand for specific products and financial incentives were also reported to greatly influence the pattern of production. Environmental conditions like soil quality, terrain, moisture availability, land policy and development programs such as agricultural programs, road building, zoning and feedbacks between these factors which included past human activity on the land such as land degradation, irrigation and roads played a major role in the decisions that people made.

### 4.0. Results

It was observed from the survey that 50 percent of the respondents had obtained up to primary education, while 20% percent had not obtained any formal education. A lower proportion (33%) had obtained secondary and post secondary level of education. 70 percent of the respondents had primary level education and below. The finding indicates that most of the respondents in the middle river Njoro sub watershed had low formal education and this affected the way in which they responded to new information on resource conservation and how they also received innovative ideas. The respondents were interviewed on the changes in natural vegetation and human settlement. 73 % of the respondents agree that human settlement has been increasing while 27% of them feel that human settlement has not been significant. 93% of the watershed inhabitants have observed massive land use changes taking place with 7% not feeling that there has been any noticeable change in land use. This possibly could be that they have recently settled in the area and since they settled there has been no change. Climate change impacts resulting from human settlement have been felt by 31% of the people with a bigger population of 69% having not experienced any effects of climate change. The pressures exerted by the society through waste disposal, over cultivation and deforestation may have led to unintentional or intentional changes in the state of the ecosystem. However, only 4% of the respondents had observed any pollution or degradation of the ecosystem with a huge population of 96% not feeling or not being aware of the impacts possibly because they had recently purchased the land.

It emerged from the study findings that the biggest proportion (60%) of the land was bought by the current owners. A number of respondents had inherited the land from their fore parents comprising about 20% of the total. There were also cases of people (15%) allocated land by the government while the remaining 5% had acquired their pieces of land through buying shares in cooperative societies (Figure 2).



**Figure 2: Land tenure**

The study also established that most of the land was under cultivation when the current owners acquired as portrayed by 31.7% of the responses. This was closely followed by grass cover which formed 26.6% of the total responses. A significant 19% reported that the land area was under indigenous trees when they initially moved in, while a 15.4% response exhibited presence of exotic trees. However, only 7.3% of the total responses reported the presence of soil and water conservation structures on the land during initial settlement period (Table 1).

**Table 1: Nature/ state and extent of Land cover during acquisition by current owners**

Land Use/ Cover	Responses		
	N	Percent	Percent of Cases
Presence of soil and water conservation structures	24	7.3%	12.9%
Under cropping	105	31.7%	56.5%
Under grass cover	88	26.6%	47.3%
Under indigenous trees	63	19.0%	33.9%
Under exotic trees	51	15.4%	27.4%
Total	331	100.0%	178.0%

An interview was carried out on some key informants concerning the land use activities that have been observed over the period of study (Table 2). The respondents reported that the main environmental impacts were indicated by a general increase in agricultural activities on riparian zones. This has emanated from pressures exerted by the increase in the number of people settling along the river Njoro. The main economic activity creating impacts to the ecosystem that was reported by these people was usually farming by the many people settling in the sub watershed which has resulted in the reduction of natural vegetation. However, the state of the ecosystem has remained a bit stable despite the heavy human settlement due to agro forestry and scattered natural vegetation that has contributed to the forest which is thriving in some parts of the ecosystem. The impacts of human settlement had altered the state of the ecosystem with most farms being seriously affected by soil erosion as most farmers were not observing any conservation measures. Hence, soil erosion was found to be notably rampant in Lare and Nessuit areas which have higher slopes with 70% of the respondents reporting severe erosion in the steeper slopes, 20% reported severe erosion on gentle slopes and 10% on flat grounds, while 20% of the people reported moderate erosion on steep areas, 69% reported moderate erosion on gentle slopes and 11% on flat

grounds. 80% of the respondents reported no erosion on gentle slopes and 20% reporting no erosion on flat areas. Nobody gave any evidence of no erosion on steep slopes (Table 2).

**Table 2: Level of soil Erosion**

Slope of the land	Level of erosion		
	severe	moderate	No erosion
Steep	70	20	0
Gentle	20	69	80
Flat	10	11	20

As a result of no proper land ownership, most people are shy to invest in long term development activities and majorities are sluggish or unable apply any resource conservation measures. Driving forces on land use and conservation of natural vegetation included most of the factors that influenced human activity that exerted pressure on the ecosystem, including population increase, poverty, land tenure and markets. Underlying factors that drive actions like food preference demand for specific products, financial incentives and environmental state indicators such as soil quality, terrain and moisture availability played a great role in altering the land cover of the area. Increasing land use/cover changes were observed in the middle river Njoro watershed ecosystem which had more settlements over the last twenty seven (27) years. These changes resulted from a number of factors, but mainly related to habitat loss due to agricultural encroachment and human settlement. Information about changing patterns of land use/cover through time and the factors influencing such changes have been captured in the change detection maps of 1987, 2000 and 2014 and the results summarized in Table 4. The Long *et al.*, (2010) formula computed the rate of change within the three periods (T1, T2, and T3).

$$\Delta = \left\langle \frac{A2 - A1}{A1} \times 100 \right\rangle \div \langle T2 - T1 \rangle$$

Where:

. = Average annual rate of change (%)

A1= Amount of land cover type in time 1 (T1, 1987)

A2 = Amount of land cover type in time 2 (T2, 2000)

A3 = Amount of land cover type in time 3 (T3, 2014)

**Table 3: Change detection**

Class Type	1987 Area Hectares T1	2000 Hectares T2	2014 Hectares T3	ΔHa 1987-2000 T1-T2	ΔHa 2000-2014 T2-T3
Forest	1460.898	405.351	145.712	-72%.	-64%
Settlement	437.403	664.109	1470.364	+52%,	+121%
Shrub land	849.281	687.820	373.150	-19%,	-45%

From the study, it is evident that natural vegetation which was indicated by forest and shrub land (Table 5) has reduced over the period the respondents have resided in the area. The result from image processing and analysis for the years 1987, 2000 and 2014 portrays a general reduction due to settlements in both forests and shrub lands within the study area Figure 3 (a,b,c).

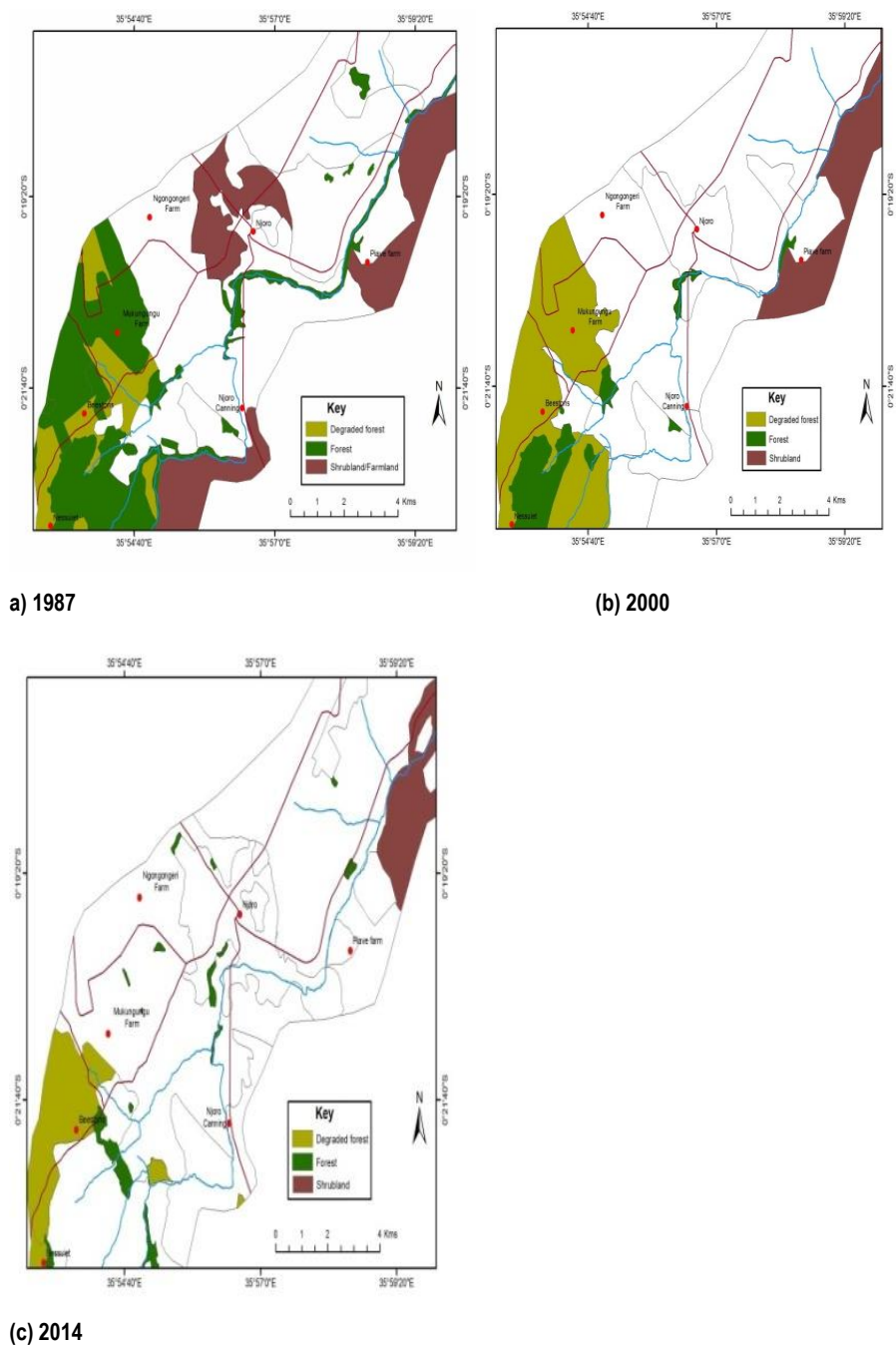
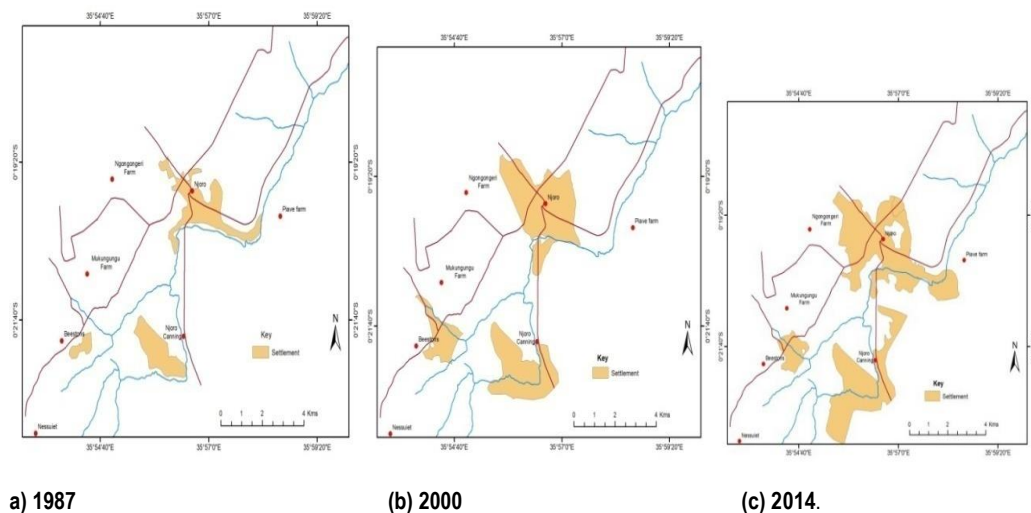


Figure 3: Reduction of Forests and Shrub Lands over the period of study.

We can therefore say that deforestation has been witnessed in the study area for the last two decades due to land use patterns. These patterns resulting from cultivation and human settlement stood out to be the major driving forces that have led to the reduction in natural vegetation cover in these areas, each constituting 33% and 30.9% of the total responses respectively. Other activities included charcoal burning, infrastructural development, and grazing and commercial timber production resulting from the growing population. The population has for the last two decades been growing. Owing to this, respondents' feedback shows that a significant increase in human settlement has been witnessed in the areas covered by the study. An assessment of the values obtained from image analysis of the area, show that there has been an almost four times increase (from about 437 ha in 1987 to 1500 ha in 2014) in the human settlements Figure 4 (a,b,c)



**Figure 4 : Human Settlement Variation in the Study for the Period 1987 to 2014**

One of the most fundamental and characteristic nature of people is the movement from place to place which most of the time results in change of residence. This phenomenon, otherwise referred to as migration, has played a vital role in elevating the number of people who have settled in the area for the past twenty or more years. Migration was a factor which explained why human settlements in these areas have grown over time greatly reducing the available size of land for each family. It is evident from the responses that the largest piece of land was 15 acres while the minimum land size was 0.125 acres giving a range value of 14.875 acres (Table 4).

**Table 4: Land size and duration of ownership**

Items	N	Range	Minimum	Maximum	Mean
Land size	200	14.875	0.125	15.000	3.07661
Duration the owner has lived on the land	200	65.0	1.0	66.0	16.817

On average, each respondent owned about 3.08 Acres of land. We had both long term occupants of the land with a period of about 66 years and some quite new occupants who had settled for about 1 year. This gave a range of 65 years which is vital in explaining the changes in the land use/ cover that has been witnessed in this area of study.

## 5.0 Conclusions and Recommendation

The factors driving land use decisions in the middle River Njoro watershed include human settlement and economic developments in the watershed community, and the corresponding changes in lifestyles, overall levels of consumption and production patterns. These drivers have exerted pressure to the ecosystem in form of waste disposal, over cultivation,

overgrazing and deforestation. These pressures have caused negative changes to the ecosystem which have caused heavy impacts mainly through removal of natural vegetation.

The removal of natural vegetation in the middle River Njoro sub watershed has resulted in the decreasing of the forest area by 1314 hectare and shrub land by 475 hectares with settlement increasing by 1032 hectares.

Land use/land cover changes mostly occurred in the upper parts of Middle river Njoro sub watershed with higher slopes and the middle and lower parts which have gentle and nearly flat slopes experiencing low or no change at all.

The integration of remote sensing and GIS was found to be effective in monitoring and analyzing land cover patterns and also in evaluating the influence of human settlement on land use change for future land development projects by the residents of study areas.

The residents are therefore recommended to develop responses to rehabilitate the degraded environment through soil and water conservation, reducing land use/land cover change (LULCC), choice of crops and crop rotation in order to mitigate the negative outcomes of the ecosystem changes.

## References

- [1] Baldyga, T.J. (2003). Assessing Land cover Change Impacts in Kenya's River Njoro Watershed using remote sensing and Hydrological Modeling. MSc Thesis (unpublished) submitted to the Department of Renewable Resources at the University of Wyoming. Laramie, U.S.A.
- [2] Dwivedi, R.S.; K.Sreenivas; K.V.Ramana, (2005). Land-use/land-cover change analysis in part of Ethiopia using Landsat Thematic Mapper data. *International Journal of Remote Sensing* 2005, 26 (7), 1285-1287.
- [3] European Environment Agency (1999). Environmental Indicators: Typology and Overview. Technical Report No. 25, Copenhagen.
- [4] EUROSTAT (1999). Environmental Pressure indicators for the EU. First Edition. Theme 8: Environment and Energy.
- [5] Fan, F.; Weng, Q.; Y. Wang, (2007). Land use land cover change in Guangzhou, China, from 1998 to 2003, based on Landsat TM/ETM+ imagery. *Sensors* 2007, 7, 1323-1342.
- [6] Fan, F., Q.Weng, and Y.Wang, (2010). Land use and land cover change in Guangzhou, china, from 1998 to 2003, based on Landsat TM /ETM+ imagery *Sensors* 7, 1323-1342
- [7] Government of Kenya, Kenya National Bureau of Statistic (KNBS) (2009). Kenya National Population and housing census, 2009.
- [8] Guerschman J.P.; J.M.Paruelo.; C.D.Bela.; M.C.Giallorenzi.; F.Pacin, (2003). Land cover classification in the Argentine Pampas using multi-temporal Landsat TM data. *International Journal of Remote Sensing* 2003, 24, 3381–3402.
- [9] Giupponi C. (2002). From the DPSIR reporting framework to a system for a dynamic and integrated decision making process. International MULINO Conference on "European policy and tools for sustainable water management" Island of San Servolo, Venice, Italy, November 21-23.
- [10] Kristensen P. (2004). The DPSIR Framework. National Environmental Research Institute, Denmark. European Topic Centre, European Environment Agency.
- [11] Leka A., Goumas S. and C. Cassios, (2005). The Modern Role and Importance of Using Environmental Indicators as a Key Tool in Environmental Management, Heleco '05, Greek Technical Chamber, Athens, Greece.
- [12] Mainuri, Z.G., and J.O.Owino, (2013). Effects of land use and management on aggregate stability and hydraulic conductivity of soils within River Njoro Watershed in Kenya. *International Journal of Soil and water conservation research*. Vol.1 No.2 pp. 80 -87.

- 
- [13] Prenzel, B.(2004). Remote sensing-based quantification of land-cover and land-use change for planning. *Progress in Planning* 2004, 61, 281–299.
- [14] Reed M.S., E.D.G. Fraser and A.J. Gougill, (2006). An adaptive learning process for developing and applying sustainability indicators with local communities, *Ecological Economics*, 59, 406–418.
- [15] Seto, K.C., C.E.Woodcock, C.Song, X.Huang, J.Lu, R.K. Kaufmann, (2002).Monitoring land use change in the Pearl River Delta using Landsat TM. *International Journal of Remote Sensing* 2002, 23, (10), 1985-2004
- [16] Tscherning K., K.Helming, B.Krippner, S.Sieber and Y.Gomez, S.Paloma, (2012).Does research applying the DPSIR framework support decision making?, *Land Use Policy*, 29(1), 102–110. United Nations (UN), 1996. Indicators of sustainable development: Framework and Methodologies. Report. 428

