

Title: Change and Organizational Demography: The Case of 30 Colombian Companies

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Résumé

Based on elements of organizational demography and using seniority (length of service), gender, and size of organization as key variables observed at two points in time (cut points) for each company, this study seeks to describe certain organizational characteristics in 30 Colombian companies. The interest in this study is based on various elements. First, it is the initial study of its kind to be conducted in Colombia using this perspective. Secondly, it is the first study to take the total workforce in each of the included organizations as a unit of analysis and observe it at two distinct moments in time. Third, it allows us to study certain hypotheses about organizational behavior – hypotheses which have been analyzed in other international contexts using similar methodologies for definition and treatment of the considered variables. And finally, the companies' employee databases are used as an information source. Based on the analysis of the different aspects, typologies for classifying the processes of change experienced by each of the companies are proposed at the end of this document

Mots clé: Organizational demography, Change, Colombia

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Overview

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Organizational demography, Change, Colombia

1. Background

Approximately five years ago, in the area of organizational demography, a group of studies using employee databases as a basic source of information for organizations began. It was from this perspective that the first general document³ seeking to promote research work in this area and with a common focus was elaborated. This first core of studies was, by nature, basically descriptive and has allowed an initial thematic approach to this novel area of research in the field of organizational studies.

A fundamental result from this initial phase of work consists in the compilation of an important base of information from the employee databases of 30 Colombian companies with diverse characteristics in terms of size, economic sector, organizational structure, areas of activity, functional aspects, etc. Based on the proposed methodology, this information corresponds equally to observations at two different cut points, therefore achieving an approximate universe of 60 observations of Colombian companies during the 1994-2003 period and covering a total of 46,909 employees.

The objective of this report is to present a vision of the entirety of the change processes that these 30 companies went through using as support the corresponding theoretical elements of organizational demography. The empirical base of this work, as mentioned before, comes from employee database information, which, in and of itself, includes a broad set of variables. This report uses only two of them: seniority (also referred to as length of service) and gender. We hope, in future research, to further study and complement the results that are presented here, taking advantage of the considerable volume of information available.

¹ Tsui and Gutek (1999), p.28.

² Tsui and Gutek (1999), p.173.

³ Ruiz, G. J. (2002)

This paper is divided into four major sections. The research objectives, presented in the first part, explain some characteristics of the research methodology, specifically that which is related to organizational demography, employee databases and the general theoretical framework. The companies and considered variables are then described. And finally, results are presented. These last sections cover the majority of the paper and are related to the description of behavior of the variables, their statistical relationships and the possible categorization result from the analysis. Some general observations, comments and conclusions are included in the final section.

2. Objectives

The present work seeks to meet the following objectives:

1. Present a comparative description of the process of change as experienced by 30 Colombian companies during the 1997-2003 period. The description of this change process will be made using the variables which correspond to previous organizational demography studies.
2. Analyze the validity of some central hypotheses in the area of organizational demography.
3. Show the applicability of employee databases as an organizational analysis tool.
4. Establish a comparative point of departure for future research conducted from the same perspective.
5. Based on the results, characterize the behavior of a set of Colombian companies.

3. Organizational Demography

Organizational demography is a relatively recent branch of organizational theory that emerged in the 1980s and is based fundamentally on Jeffrey Pfeffer's framework in his well-known 1983 paper.⁴ Since that time a significant volume of work has been developed geared toward illustrating some of the proposed ideas and, at the same time, establishing the boundaries and the playing field of a new specialty, trying to define the areas and subareas which make it up. A complete work of synthesis can be found in the important book by Anne T. Sui and Barbara A. Gutek published in 1999.⁵ In this publication there is an exhaustive inventory of the research conducted to date, showing also the non-existence of research in Latin America from this perspective.

The literature distinguishes four general areas of organizational demography: interorganizational, intraorganizational, career and organizational development, and external populations⁶. Tsui's book similarly introduces three approaches to

⁴ Pfeffer, Jeffrey (1983).

⁵ Tsui and Gutek (1999).

⁶ Stewman, Shelby (1988). P. 176

organizational studies from the demographic point of view: the *categorical approach*, the *compositional approach* and the so-called *relational demographics approach*.⁷ It also introduces the following three levels of analysis: dyads, groups and organizations.

There is a certain diversity in the definition of organizational demography. In general terms, by applying organizational demography, organizations can be seen as analogous to nature and the elements of birth, growth, reproduction and death. Pfeffer affirms: “demography refers to the composition, in terms of basic attributes such as age, educational level, length of service or residence, race, and so forth of the social entity under study.”⁸ Demography, starting with those events which are studied, relates the inherent physical aspects of a person to that person’s acquired aspects. In this sense, for example, sex or age are variables inherent to the existence of the individual, meanwhile, marital status, number of children, profession or job title are acquired aspects and subject to individual will. This duality studied in the context of organizations opens up important analytical possibilities which have been, up to now, quite unexplored. The levels of analysis correspond to those of traditional organizational analysis, that is to say: interorganizational, organizational, departmental, group and individual. Another aspect which is inherent to organizational demography consists of the study of aggregate – not individual – phenomena, opening up space for the study of minorities, majorities, their evolution and their incidence in the organization and its behavior.

Even though this analogy is interesting and intuitively easy to establish, it has not been sufficiently developed, however, in the area of organizations. There are significant gaps in the research which make one aware of this useful analogy in the different and promising variations that some researchers have glimpsed in this area. Especially noticeable is the lack of research in two areas: the first corresponds to the so-called intraorganizational demography, and the second to research in which the entire organization – the total of the workforce – is the unit of analysis. This second perspective has been proposed as a line of research to be developed in which the information from the companies’ employee databases can reveal itself as a useful instrument for development, giving origin to a new tool for organizational research.⁹ In Latin America, and specifically in Colombia, work in this area is practically non-existent.

4. Theoretical Elements

In this first theoretical section we will attempt to determine the terrain in which this research is located as well as the type of analysis which we intend to develop. To do this, we will initially apply the categories suggested by Shelby Stewman and the typologies established by Tsui and Gutek.

As previously mentioned, the theoretical elements which support the research work are especially strengthened by the support which comes from organizational demography. This work has taken, as its level of analysis, the organization in its totality. In this sense, although the work could be understood in the area which corresponds to intraorganizational demography, nevertheless, the comparisons are between the companies which are part of the sample, analyzed from a global vision of each organization and observed at two distinct moments in time for each. This allows the size

⁷ Tsui and Gutek (1999) p. 19.

⁸ Pfeffer, Jeffrey (1983) p. 303.

⁹ Tsui and Gutek (1999) p. 177.

of the organization to be included as one of the variables to be studied. At the level of intraorganizational demography a great number of hypotheses emerge, studied from the perspective which Stewman in his article defines as, “The difference in this work from most prior efforts has been in the attempt to go beyond individual demographic attributes to group level demographic effects. Hence, the new demographic structure is not simply the distribution of individuals (in seniority or age) but assumed relationship (communication, cohesion) between individuals, based on demographic similarities, which has an independent effect.”¹⁰

Following Tsui’s typology and related to the proposed type of analysis, this work is essentially positioned as categorical approximation and compositional approximation. Categorical approximation is understood as the study of individual characteristics and their relation to on-the-job behavior. One example of this type of work is the so-called gender studies which seeks to evaluate the degree to which women or men behave differently in the working world. An example is hierarchical position and its affects on individual behavior in the company. Compositional approximation looks at the individuals in aggregate and the effect of their behavior in the organization. In simple terms this type of research distinguishes the difference between the individual alone or in a group, and whether the group constitutes a majority or is part of a minority. One of its principal axes in this type of research is the study of homogeneity or heterogeneity in groups.

4.1 Hypotheses

The field of organizational demography has established a series of hypotheses about organizational behavior. The study of these hypotheses raises a series of reflections about the universal or contingent character of pertinent phenomena of this type of entity and its different levels of analysis. To establish and study these hypotheses results has consequences which are important to the understanding of the studied phenomena and the possibilities for generalization, including the search for information and related findings.

Based on the collected information this present research seeks to explore some of these hypotheses. In order to do this, we will turn to simple statistical tools which allow the evaluation of likelihood of such assumptions. In general, for the study of these hypotheses, given the exploratory and initial character of this research, only some of the best-known work in the corresponding literature will be considered.

One of the most-studied variables in organizational demography has been seniority or length of service (LOS) in the organization. Pfeffer proposed a series of hypotheses related to the behavior of this variable and its consequences with a varied set of organizational results.¹¹ Among those results, the following are considered: turnover, innovation, culture, structure, interorganizational relationships, distribution of power and organizational efficiency. In this sense there are numerous empirical investigations directed toward looking at these aspects using different levels of analysis, variables and techniques. As much as diversity exists in the methodology, it will exist in the results. In general, the study of homogeneity or heterogeneity in the distribution of seniority is a fundamental interest in these studies. One kind of hypothesis of this type could be the following, “similarity in time of entry into the organization will positively affect the

¹⁰ Stewman, Shelby (1988) p. 178.

¹¹ Carroll, G. and Hannan, M. (2000) p. 33.

likelihood of persons communicating with others who entered at the same time. We also hypothesize that the more frequent the communication, the more likely it is that those interacting will become similar in terms of their beliefs and perceptions of the organization and how it operates.”¹²

In general the type of tests conducted consist of statistically relating the distribution of this variable with any of the results in the organization, especially turnover, therefore establishing a point of departure for nearly all intraorganizational demography research.¹³

One significant void in intraorganizational demography research, as previously mentioned, has been that of relating the size of the organization with a demographic variable which corresponds to the organization. This variable has been studied, but at a corporate level, finding, for example, that the smaller organizations have a greater probability of disappearing.¹⁴ Intuitively, some relationship between the size of the organization and one of the internal variables, in this case, its relationship with seniority, could be assumed.

With respect to organizational composition, one of the most-researched topics has been the study of participation by sex and its affects on the organization. Research has concentrated on the composition by sex of the different organizational levels and the affects on turnover, finding, for example, that there exists a smaller possibility of turnover in the case of women when the number of female hires increases according to hierarchy. In the case of males, turnover increased proportionally when more men were hired to directive levels.¹⁵

Complementing that research, studies of the gender variable, its homogeneity or heterogeneity and its relationship to some organizational results, have been conducted. It is important to clarify that although they are related, the variables “sex” and “gender” are not the same. The gender variable does not make a distinction between sexes; rather, it measures the prevalence or absence and equally studies its variations. In order to study this relationship, the Blau indicator is used.¹⁶ The indicator used for this project is a variation on the same index which facilitates its reading. Its value is always positive and moves between 0 and 1. The value 0 indicates greater variability and 1, a greater homogeneity.¹⁷

4.2 Employee Databases

The information which exists in a company’s employee database is a set of data which is permanently available and updated as a result of the organization’s ongoing activity. This information is easily adapted to the inherent values of the work of organizational demography. Beginning around 1999, academic research has resulted in approximately

¹² Wagner, Pfeffer, O’Reilly(1984) p.76.

¹³ Carroll, G. and Hannan, M. (2000) p. 33.

¹⁴ Carroll, G. and Hannan, M. (2000) p. 4.

¹⁵ Elvira, M. and Cohen, L. (2001) p. 591.

¹⁶ Tsui and Gutek (1999) p. 31.

¹⁷ Partially adjusting Blau’s measurement and taking advantage of the symmetry the measurement, the following mathematical procedure can be made to obtain a more manageable value. Subtract 0.5 from either of the two values to obtain the absolute value and multiply by two. This gives as a result the following values: 0=100% heterogeneous and 1=100% homogeneous. This index is used to measure the variability of dichotomizing variables.

20 undergraduate and graduate theses in the Business School at the Universidad de los Andes. These studies have allowed the creation of an important database which corresponds to the employee payrolls of 30 Colombian companies with diverse characteristics. These studies make up the input for the present research document.

4.2.1 The Companies

As previously mentioned, the research developed to date has allowed the creation of a general informative database of employee databases from 30 Colombian companies. Based on this methodology, we have achieved comparative studies that have permitted the use of information from each company at two different times during the 1994-2003 time period. It is important to clarify that this sample of companies does not attempt to present statistical representativeness as the criteria for obtaining the information, but rather each one of the specific research projects referred to above. Nevertheless, observing the totality of the companies, one cannot help but notice the interesting composition among them: the Central Bank of Colombia, the electric and water companies in Bogotá, some of the most important health care providers in the country, small manufacturers, regional utility companies, educational institutions, service companies, etc. With the objective of maintaining confidentiality, the companies are not specifically identified at the moment of data analysis. There is, however, a complete list of those companies included in this study in Appendix 1.

In general terms, there are 60 observations of 30 companies covering a total of 46,909 employees. Looking at size, eight of these companies have fewer than 100 employees, 15 have between 100 and 1000 employees, and seven have more than 1,000 employees. The smallest company has 58 employees and the largest has 2,930.¹⁸ In the year 2001, of the total number of companies in Colombia, 9% were considered large companies (57% of employment), 22% were considered medium companies (27% of employment), 47% were considered small companies (14% of employment), and 22% were considered microcompanies (2% of employment).¹⁹

Information from two cut points is available for each organization; but there is no other uniformity to this aspect. The time includes the years between 1994 and 2003, however the time lapses for each organization is different; as shown in Table 1, the shortest time is one year, and the longest is seven years.

Differences in years between the two cut points			
Difference			Accumulated
Years	Companies	Percentage	Percentage
1	5	0,17	16,67
2	8	0,27	43,33
3	6	0,2	63,33
4	6	0,2	83,33
5	1	0,03	86,67
6	2	0,07	93,33
7	2	0,07	100
Total	30	1	

Table 1

¹⁸ It is important to note that these numbers correspond to the second cut point for the respective companies. In Colombia, according to the size of their payroll, the companies are classified as follows: **Micro**: less than 20, **Small**: 20-99, **Medium**: 100-200, **Large**: more than 200 employees.

¹⁹ Arbeláez, Zuleta and Velasco (2003).

Finally, although the majority of the companies are located in Bogotá, there are a few located in other regions.

4.2.2 The Variables

It is important to indicate that a large number of variables are made available from the companies' employee databases. These variables are neither the same in all of the companies nor across time. In the case of the present research, just two variables, which are found in all of the studied databases, have been chosen with the goal of guaranteeing the greatest analytical homogeneity possible at the time of determining the calculations and the comparisons. Additionally, and given that a more dynamic vision of the organization is achieved with the two cut points, there is an opportunity for considering stock variables and flow variables. There are 60 observations for the stock variables, and 30 for the flow variables. Another important aspect that is worth emphasizing is the fact that even though there are only two variables, the possibilities for analysis are nevertheless quite significant. It is important to adopt a somewhat minimalist vision in this first study, in future studies, however, the considerable number of available variables can gradually be considered.

The selected variables are: *start date* in the organization and *gender* for each of the employees at the 30 companies at two cut points. From these two variables, the following indicators can be calculated:

Stock variables:

- Total number of employees in the organization.
- Average seniority for each organization.
- Standard deviation of seniority for each organization.
- Coefficient of variation for seniority. This is a typical variable in organizational demography that allows the study of homogeneity or heterogeneity of a variable. It corresponds to the quotient between the standard deviation and the average value of the variable and is usually expressed as a percentage.
- Proportion of females in the organization.
- Indicator of homogeneity of gender. This indicator, as previously explained, is derived from the "Blau index".²⁰ It is an indicator that establishes the variation in the case of a dichotomous variable. At the same time it is an indicator used frequently in organizational demography. It is constructed in such a way that the measurement that approximates 0 represents a more heterogeneous group in terms of gender and that which approximates 1 is more homogeneous. To maintain simplicity in this present paper, it will be referred to as the "Blau index".

Flow variables:

- The difference between the two cut points. For this present paper, this variable will be calculated in number of years.
- Turnover. This is also a typical variable in organizational demography research and describes the percentage of people who enter or exit an organization in a determined lapse of time. In this case there is no distinction made between obligatory and voluntary turnover.
- Difference in the coefficient of variation. This is a variable which seeks to describe the increase in the homogeneity or heterogeneity of a variable over time. In this case

²⁰ See note on page 20.

it refers to the homogeneity or heterogeneity of the organization in terms of employee seniority.

- Variation in female participation. This indicator measures the difference in the participation of women in the organization during the determined lapse of time.
- Variation in the homogeneity/heterogeneity of gender. This variable seeks to measure the increase or decrease of the homogeneity of the dichotomous variable considered.

4.2.3 Results

The process of change that we seek to describe will be based on the flow variables, specifically those variables which show the evolution or transformation that these 30 companies went through during the defined period of time. These variables are: turnover, variation in homogeneity/heterogeneity of seniority, variation of female participation, and variation of the homogeneity/heterogeneity of the gender variable.

4.2.3.1 Turnover²¹

This group of companies experienced – with varying results – changes in the size of their organizations during this period of time. With the objective of measuring the magnitude of change in size in these 30 organizations a respective turnover coefficient has been calculated. This is illustrated in Table 2 where the main statistical values are shown in the following.

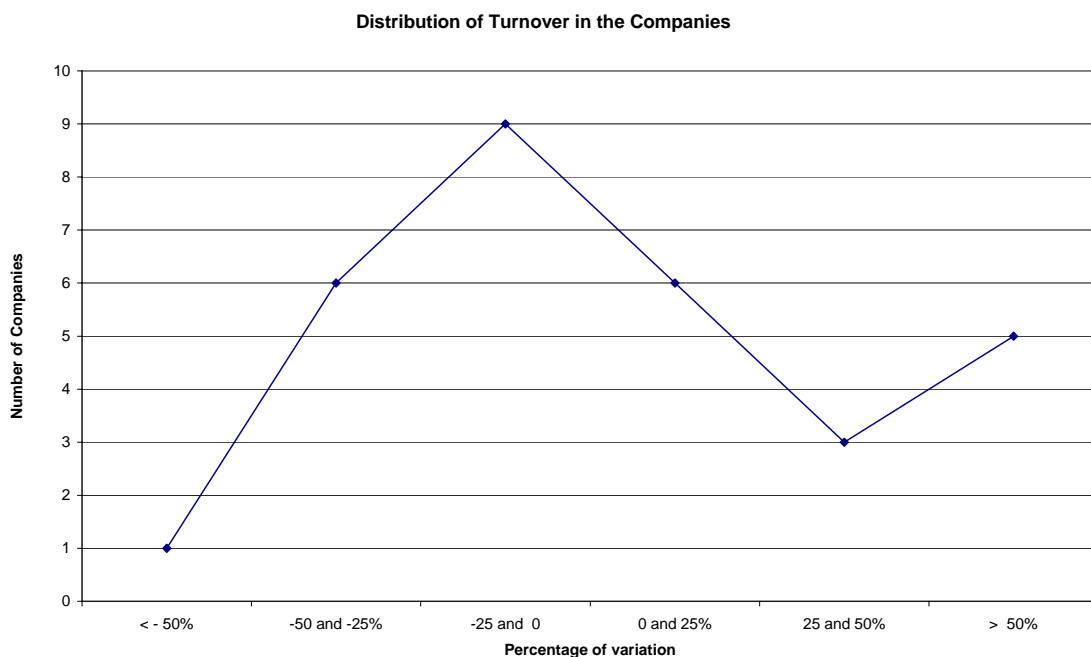
Turnover indicator in 30 Colombian companies

Turnover		
Percentage values		
Average		17,3
Median		-2,3
Standard dev		79
Minimum		-60,3
Maximum		386,1
Percentiles	25	-18,2
	50	-2,3
	75	27,4
N		30

Table 2

²¹ The turnover index does not differentiate between voluntary and obligatory turnover, rather it looks at total turnover and is defined as the difference in the number of employees in the time interval considered compared to the initial value. It is expressed as a percentage.

This table shows a very wide distribution of the turnover for these 30 companies. On one hand, drastic processes of staff reduction reaching decreases of up to 60% of personnel are represented, and on the other, there is a personnel increase of 380%.²² On average the organizations show an increase of 17% in their personnel, however, 50% of these organizations presented decreases greater than 2%.²³ In absolute terms the decrease was 2,440 employees, which represents a turnover of 10.1%. The total number of employees at the second cut point corresponded to 22,234 for the all 30 companies. It is interesting to observe the way in which similar economic conditions affect the companies in very different ways. There is a notable dispersion in behavior as revealed in the high value of the standard deviation with respect to the average. Graph 1 shows this very distribution. This graph even shows that five companies increased their personnel by more than 50%.



Graph 1

4.2.3.2 Homogeneity and Permanence in the Organization

Seniority (LOS) in the organization has been another favorite variable in organizational demography research. This variable has been used in different studies from various perspectives, generally applied as a results variable, for the study of other intraorganizational aspects. In the case of the companies analyzed here, this variable shows fairly disperse behavior; its evolution for the two cut points is shown in Table 3. For the first cut point, the company average was 6.9 years, evolving to 7.1 years in by

²² It is important to clarify that on some occasions, with regard to the existence of small base values of those variables considered, it happens that changes in not very large absolute values generate a distortion of the numbers when the relative values are calculated. Some of these extreme values were excluded in the analyses conducted.

²³ Despite the fact that the calculation may differ, some numbers like datum point with respect to this variable are included. In the United States the rate of voluntary turnover for the industry average during the time period of September 2002 to August of 2003 was 19.2%. Source: U.S. Labor Department. The average turnover for the industrial sector in Colombia was 21.5% from 1977-1999. Source: Dynamics of Industrial Employment in Colombia. Javier Rivas Mayorga. PNUD Notebooks. 2000.

< <16 e Conférence de l'AGRH-Paris Dauphine-15 et 16 septembre 2005>>

the second cut point. Regarding the 50% of companies whose seniority at the first measurement was 6.9, by the second it had diminished to 5.48 days.²⁴

Evolution average seniority (years)		
	First cut point	Second cut p
Average	6,84	7,1
Median	6,94	5,48

Table 3

For this second variable the Coefficient of Variation for seniority in each of the two cut points will be taken as a descriptive value. In other words, this indicator provides an image of homogeneity related to seniority at each of the moments studied. If the difference in the value of this indicator is considered, it could determine the variation in the homogeneity of the company related to overall seniority in the organization. In organizational demography the homogeneity of the length of service is a variable which seeks to relate to numerous aspects of organizational behavior, such as: culture, conflict, communication, etc.²⁵

Table 4 shows the behavior of this variable in descriptive statistical terms. It shows the change experienced by the coefficient of variation of the seniority variable expressed as a percentage between the two cut points.²⁶ This variable, much like the volatile turnover, oscillated between a decrease of 32% in its value and an increase of heterogeneity of 99%. An increase in its value indicates an increase in the heterogeneity of the group and a decrease indicates an increase in the homogeneity. On average, for the overall group of companies, the heterogeneity in the seniority of the personnel increased by 4.8%. In 15 of the organizations the homogeneity of the personnel increased by values greater than 4% and this very high dispersion is not only reflected by the range of the variable but also by the high value of the standard deviation related to the average of the variable.

It is important to observe that at the first cut point the average value of the coefficient of variation for the total of the 30 companies was 81% and 15 of them had values less than 78%. At the second measurement this average value went up to 85% and 15 of the companies had values less than 81%.

²⁴ In January, 2004, average seniority for industry in the United States was four years. Source: US Department of Labor.

²⁵ Pfeffer, J. (1983) p.320

²⁶ It is necessary to consider the interpretation of this value since it is a percentage related to the variation coefficient which is expressed in percentage values. This indicator expresses the change in the value of the percentage at both cut points related to the initial value.

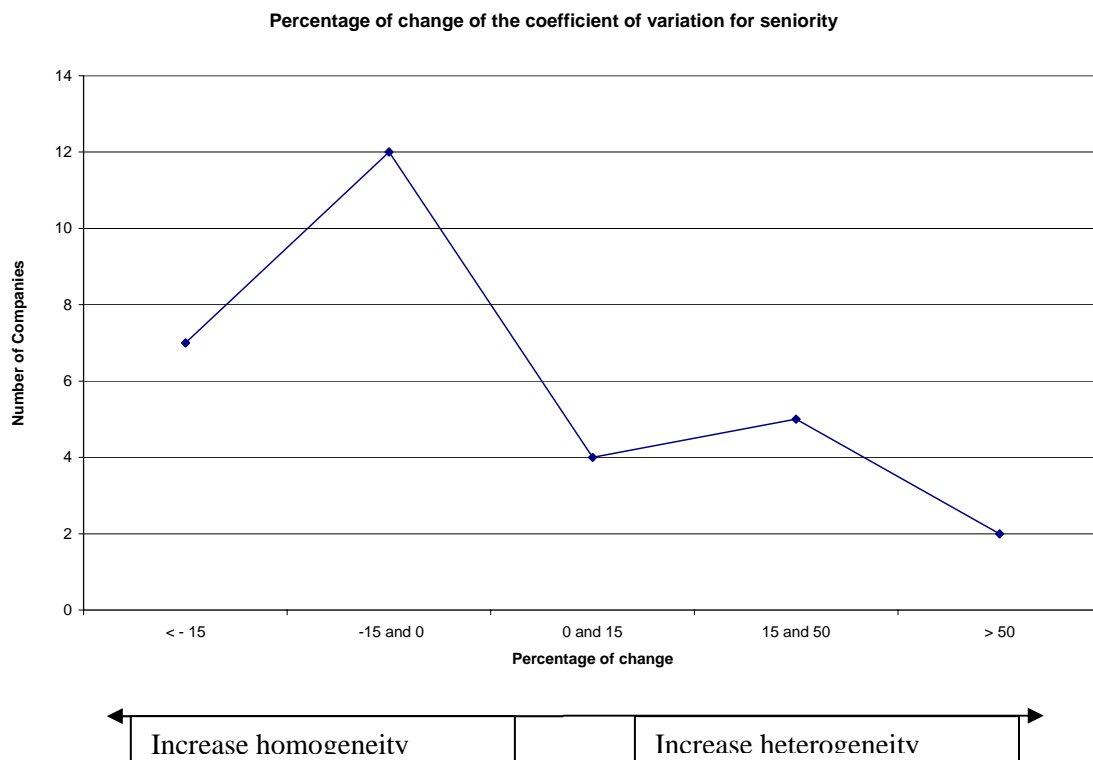
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Difference in the variable coefficient between the two cut points

	Values (%)	
Average		4,81
Median		-3,97
Standard dev		29,82
Minimum		-31,83
Maximum		98,68
Percentiles	25	-13,84
	50	-3,97
	75	15,09
N		30

Table 4

In Graph 2, the distribution of the seniority variable shows how the majority of the companies experienced an increase in the homogeneity of the distribution of seniority, including seven of them whose values of the variable coefficient decreased by more than 15%.



4.2.3.3 Female participation

One of the favorite topics in organizational demography research is that of gender studies. In Latin America and Colombia, the growing participation of women in the work world is affecting organizational behavior. This, in turn, is reflected in, among other aspects, turnover numbers, increases or decreases of female participation, and the constitution of a majority or being part of the minority.

Distribution of female participation

Female participation		
	Frequency	Percentage
Less than 25%	10	16,7
Between 25- 50%	34	56,7
Between 50- 75%	15	25
More than 75%	1	1,7
Total	60	100

Table 5

Table 5 describes the distribution of female participation for the set of 30 companies at the two considered cut points. According to the table, there are 16 companies in which the women are the majority; this is equivalent to 26% of the total. The way in which this variable has evolved during the lapse between the two cut points is described in the following.

In Table 6, which shows this evolution, one observes an average increase of 10% in the female participation in the 30 companies between the two cut points. Much as with the previous variables, high volatility is reflected by the high value of the standard deviation with respect to the measurement. Equally, the maximum and minimum limits are noted in extreme situations: a decrease of 13% and an increase of 200%. In half of the organizations the increase in the participation was greater than 2%.

Variation in the participation of women between the two cut points

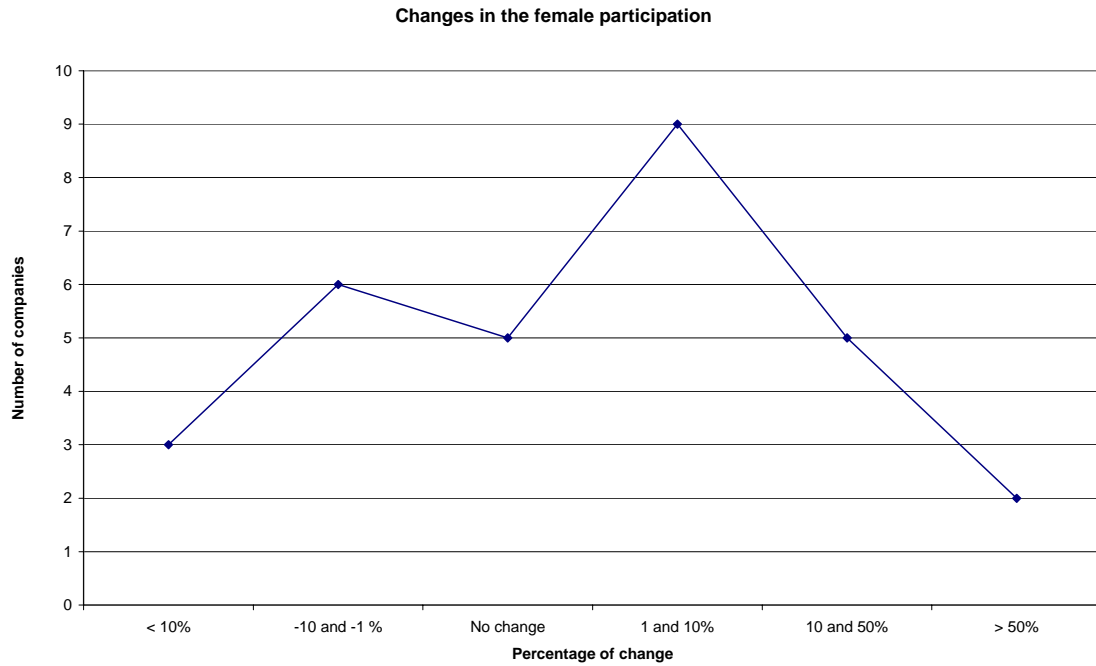
	Values (%)	
Average		10,81
Median		2,04
Standard deviation		38,25
Minimum		-13,73
Maximum		200
Percentiles	25	-2,52
	50	2,04
	75	8,24
N		30

Table 6

At the first measurement average participation by women was 40% with 15 of these companies indicating participation greater than 40%. At the second, the average value had increased to 42% with half of the companies indicating a value greater than 44%.²⁷

Graph 3 is included to better describe the process that these companies went through. Nine companies experienced relatively light decreases in the participation of women, while 16 companies showed significant increases in the values for participation of women. Five companies showed no changes for this variable.

²⁷ In the United States the participation of women in the work world was 45% for 1988, and is predicted to be 48% for the year 2008. Source: U.S. Department of Labor.



Graph 3

4.2.3.4 Changes Experienced

In a brief synthesis of what has occurred up to this point, it can be affirmed that this group of 30 companies experienced quite disparate change processes in terms of turnover, seniority and female participation. On one hand, even though in these companies there is an increase in the average turnover, nevertheless, the increases in the number of employees of some of the companies do not compensate for the decreases that others experienced in absolute terms – the total number of jobs corresponding to these companies diminished approximately 10%. Related to seniority in the organization, we note an average increase in the value from 6.8 to 7.1 years between the two cut points, nevertheless there was an increase in the average heterogeneity in the distribution of seniority in the total of the companies. Turning to female participation, there is growth of approximately 10% between the two cut points, which leads to female participation being the majority in one-fourth of the companies.²⁸

4.3 Hypotheses and companies

Based on the theoretical framework described in the following, there is a set of six hypotheses that are established from the collected data. Even though some of these hypotheses, or affirmations, are well-known in other contexts, and could eventually seem redundant, they nevertheless represent an important starting point for positioning the behavior of Colombian organizations in a more universal context. The consequences of confirming, or not, some of the relationships described here are not exhaustively detailed, but rather, are accompanied by some comments based on their observation. Later, in the last section of this paper, a typology is established which allows the studied

²⁸ It is important to emphasize that the organization as a whole is the object of study in this work. If we were to take the individuals in the organization as the unit of analysis, it would be necessary to weight the indicators in function of the size of the organization, consequently varying the results.

organizations to be grouped by means of a statistical analysis by conglomerates, seeking to compile the total experience of this research.

4.3.1 First Affirmation

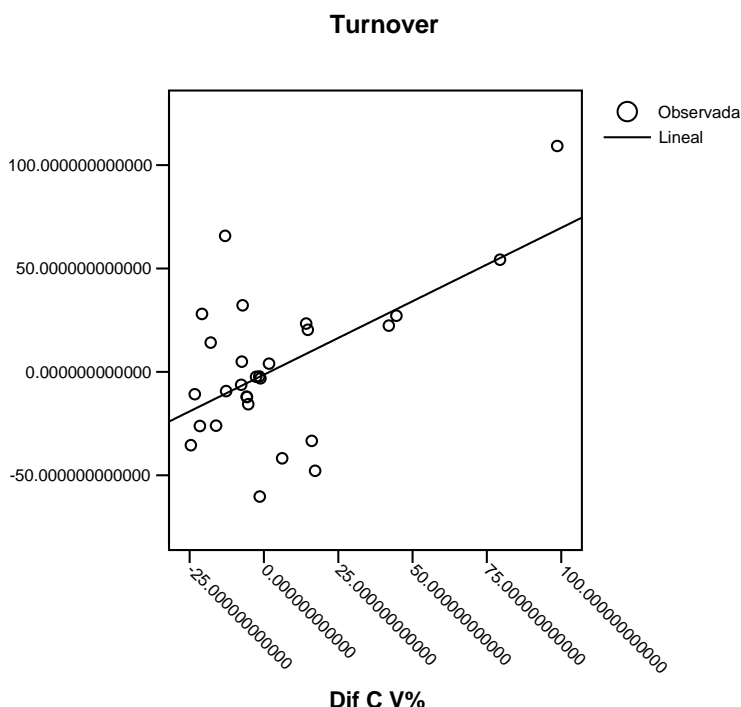
A direct relationship is observed between turnover and the increase in the heterogeneity of seniority in the organization. This is a traditional hypothesis in organizational demography studies, and it indicates that a greater variability in the seniority in the organizations presents higher turnover. Since these are two flow variables, 30 observations were made, the two extreme values were excluded and a linear adjustment was applied to obtain the results that are shown in Table7 and Graph4.

		Turnover	Dif C V%
Turnover	Correlación de Pearson	1	,576**
	Sig. (bilateral)		,001
	N	28	28
Dif C V%	Correlación de Pearson	,576**	1
	Sig. (bilateral)	,001	
	N	28	28

** La correlación es significativa al nivel 0,01 (bilateral).

Table 7

Dependent Mth	Rsq	d.f.	F	Sigf	b0	b1
Turnover LIN	,331	26	12,88	,001	-1,3041	,7098



Graph 4

This first hypothesis allows us to show that for the case of the 30 Colombian companies, one of the basic assumptions of organizational demography, the existence of a clear relationship between the behavior of an internal organizational variable and one of its results, is exactly fulfilled. This affirmation adheres to certain universality since it

is independent of any organizational characteristic, including, for example, the type of organization governmental or private, its sector (manufacturing, services, agro-industrial), etc. It is interesting to highlight the use of the difference in the coefficient of variation between the two cut points as an indicator of homogeneity/ heterogeneity, and to confirm the positive and increasing relationship with turnover.

4.3.2 Second Affirmation

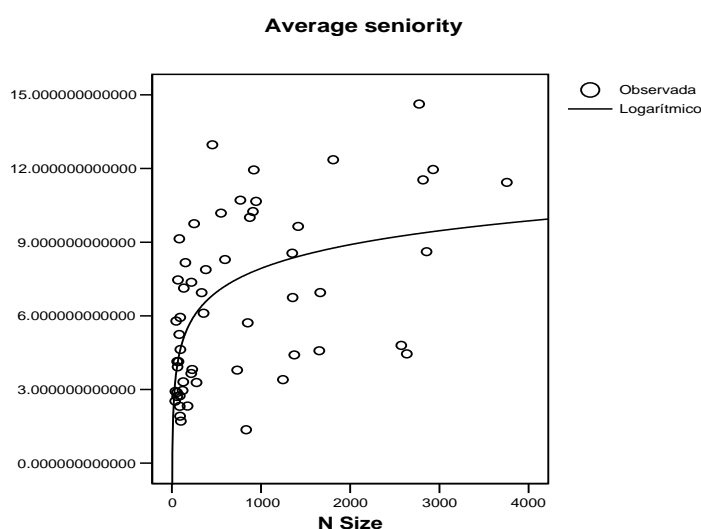
A significant correlation is observed between size and seniority. It could be affirmed that to the extent that an organization increases its size, it increases its average seniority. For this first relationship, and given that for the two stock variables there was a total of 60 observations, a logarithmic adjustment was made, finally achieving a correlation coefficient that was highly significant, excluding the four extreme observations. The results are shown in Table 8 and Graph 5.

		N Size	Average seniority
N Size	Correlación de Pearson	1	,503**
	Sig. (bilateral)		,000
	N	56	56
Average seniority	Correlación de Pearson	,503**	1
	Sig. (bilateral)	,000	
	N	56	56

** . La correlación es significativa al nivel 0,01 (bilateral).

Table 8

Dependent Mth	Rsq	d.f.	F	Sigf	b0	b1
Aver.senio LOG	,318	54	25,19	,000	-1,7010	1,3946



Graph 5

This is perhaps one of the most important findings in this work. First of all, and according to the literature reviewed, the size of the organization variable had not been previously considered in organizational demography studies from the same perspective as this present work. Secondly, this hypothesis coincides with some research that shows the conformation of bureaucratic structures to the extent to which organizations increase

their size, the aspects of organizational stability also increase.²⁹ It is also interesting to note that the slope of the curve shows high increases in seniority, up to a certain scale, at which point this increase diminishes considerably, achieving a more vegetative type of relationship.

4.3.3 Third Affirmation

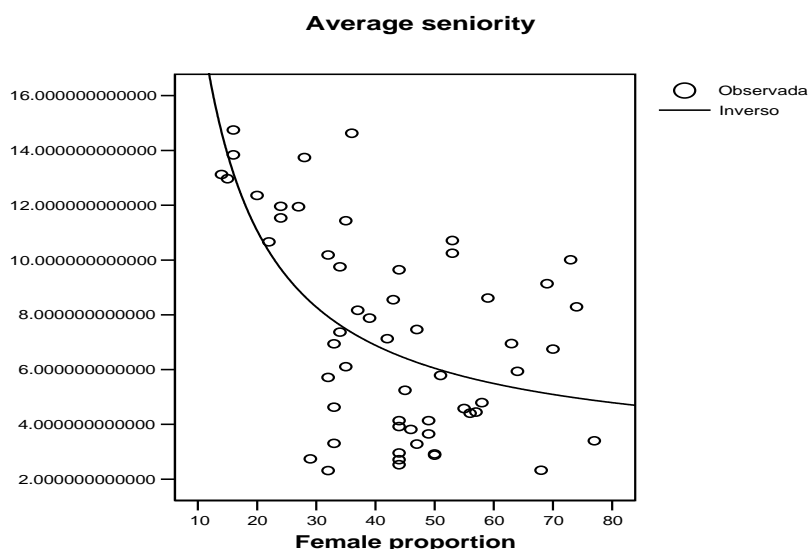
According to the collected information, to the extent to which female participation increases, the average seniority in the company decreases. This means that to the extent to which women participate in the organization, the average value of the seniority variable diminishes. For this relationship, given that the information comes from 60 observations, an adjustment was made by taking the inverse variable and a highly significant correlation was obtained, excluding the four most extreme observations. Results are shown in Table 9 and Graph 6.

		Average seniority	Female proportion
Average seniority	Correlación de Pearson	1	-,474**
	Sig. (bilateral)		,000
	N	56	56
Female proportion	Correlación de Pearson	-,474**	1
	Sig. (bilateral)	,000	
	N	56	56

** . La correlación es significativa al nivel 0,01 (bilateral).

Table 9

Dependent	Mth	Rsq	d.f.	F	Sigf	b0	b1
Aver.senio	INV	,372	54	31,97	,000	2,7013	167,459



Graph 6

This third finding is equally relevant since it could show that in the 30 companies the increasing participation of women is attributed to people who have recently joined the organization, replacing men with high seniority in the organization. This affirmation

²⁹ Ogliastri, Ruiz and Martínez (2004).

equally coincides with the increase of 10% in their participation, in the total of considered companies, shown in the first part of this paper.

4.3.4 Fourth Affirmation

There is a growing relationship between the heterogeneity of seniority and the increase of female participation. This affirmation describes the growing and positive relationship between the variability of seniority and the growing female participation. These are two stock variables and as such, 60 observations were taken, and a linear adjustment was made which excluded the two extreme values. Results are shown in Table 10 and Graph 7.

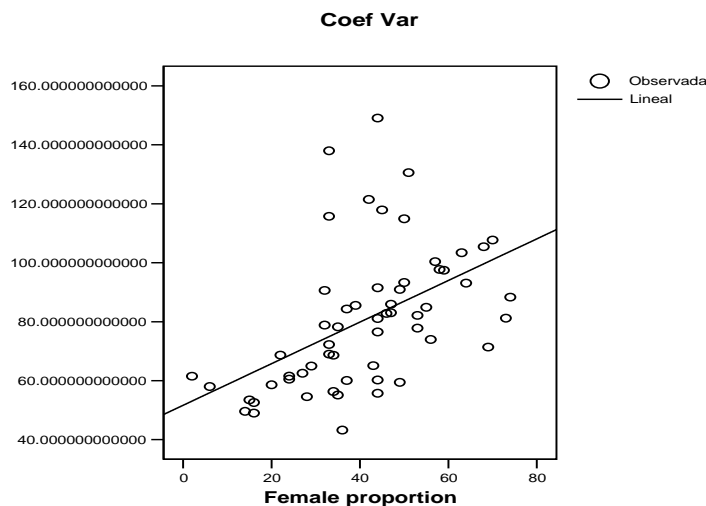
Correlaciones

		Coef Var	Female proportion
Coef Var	Correlación de Pearson	1	,493**
	Sig. (bilateral)		,000
	N	58	58
Female proportion	Correlación de Pearson	,493**	1
	Sig. (bilateral)	,000	
	N	58	58

** . La correlación es significativa al nivel 0,01 (bilateral).

Table 10

Dependent	Mth	Rsq	d.f.	F	Sigf	b0	b1
CV	LIN	,243	56	17,96	,000	51,6660	,7053



Graph 7

This fourth affirmation partly complements the previous one, and both show the way in which, during the considered time period, the participation of women has been increasing, therefore implying an increase in the heterogeneity in the permanence in these companies.

4.3.5 Fifth Affirmation

There is a growing relationship between the homogeneity of the gender variable and the average seniority in the organization. This relationship allows the suggestion that the extent to which the organization is older, increasingly one of the two sexes will

predominate. For this fifth affirmation, keeping in mind that this information was for a stock variable, 60 observations were made. The relevant adjustments were made and the two extreme observations were excluded, and a linear adjustment was made. Corresponding results are presented in Table 11 and Graph 8.

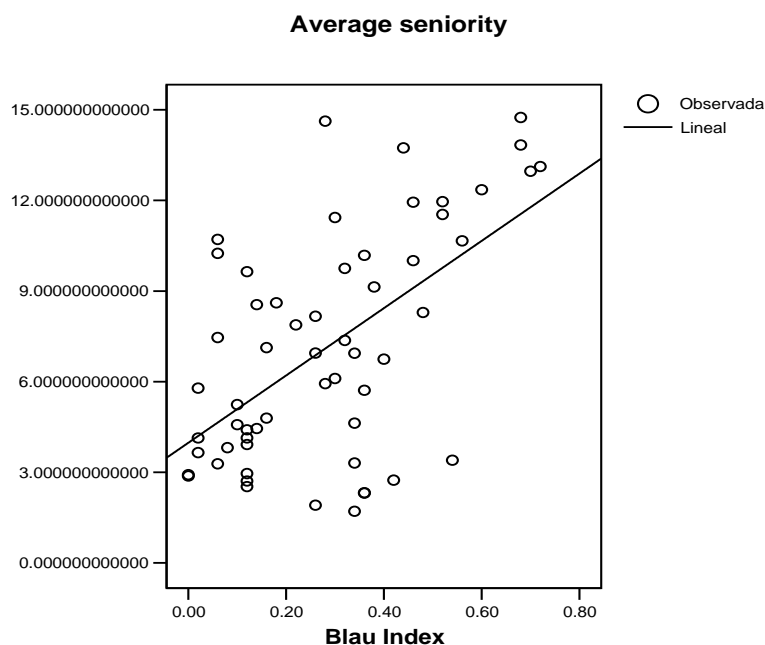
Correlaciones

		Blau Index	Average seniority
Blau Index	Correlación de Pearson	1	,578**
	Sig. (bilateral)		,000
	N	58	58
Average seniority	Correlación de Pearson	,578**	1
	Sig. (bilateral)	,000	
	N	58	58

** La correlación es significativa al nivel 0,01 (bilateral).

Table 11

Dependent	Mth	Rsq	d.f.	F	Sigf	b0	b1
Aver.senio	LIN	,334	56	28,03	,000	3,9783	11,1397



Graph 8

When establishing a relationship between this fifth affirmation and the previous one, one could conclude that to the extent that women increases their participation, the average seniority in the company would decrease. Nevertheless, this situation presents a limitation when women become the majority, at which moment the organization once again shows an increase in average seniority.

4.3.6 Sixth Affirmation

There exists an inverse relationship between the heterogeneity of the length of service and the homogeneity of gender in the organization. This means that with greater variability of seniority there is a greater variability in the composition of gender in the observed companies. Beginning with the 60 observations a linear adjustment was made and the two extreme values were excluded. Table 12 and Graph 9 show the results.

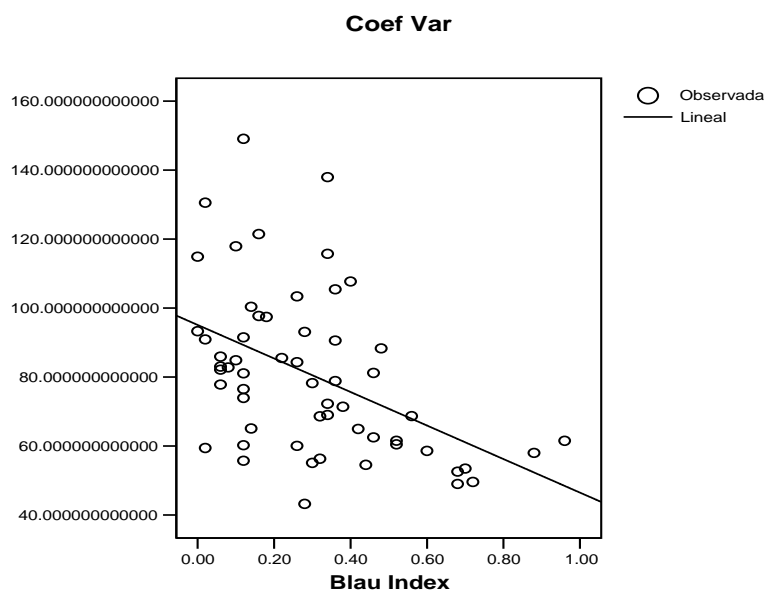
Correlaciones

		Coef Var	Blau Index
Coef Var	Correlación de Pearson	1	-,465**
	Sig. (bilateral)		,000
	N	58	58
Blau Index	Correlación de Pearson	-,465**	1
	Sig. (bilateral)	,000	
	N	58	58

** . La correlación es significativa al nivel 0,01 (bilateral).

Table 12

Dependent	Mth	Rsq	d.f.	F	Sigf	b0	b1
CV	LIN	,217	56	15,48	,000	95,1213	-48,616



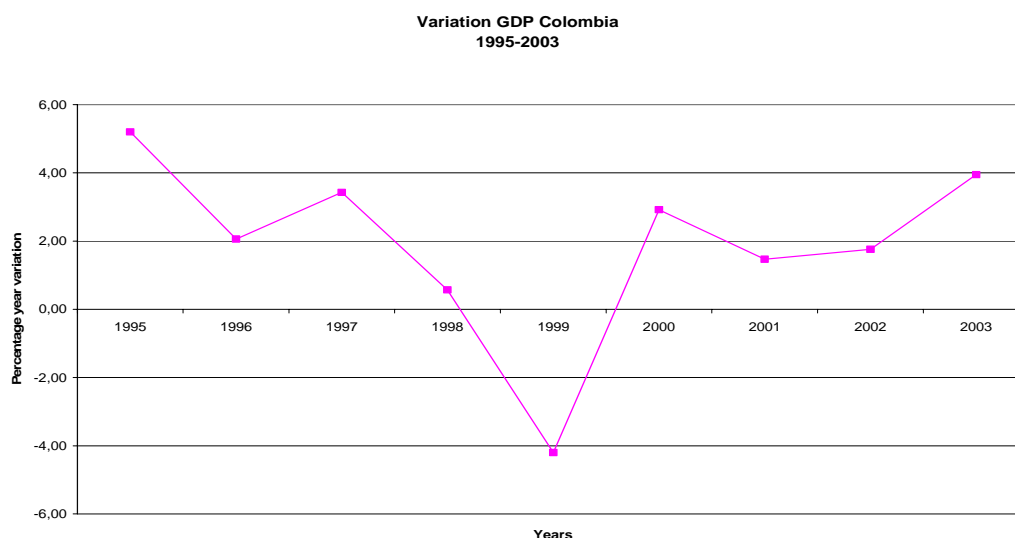
Graph 9

This sixth affirmation contributes to a corroboration that the process lived by these companies corresponds to a growing participation of women in a group of principally masculine companies, generating an important process of gender substitution.

4.3.7 Synthesis of Observed Changes and an Intent to Provide Typologies

Based on the previously presented figures, a synthesis (to a certain extent speculative) will be developed in this section of the document. The tables from the first part of the paper, and the affirmations or hypotheses from the second will be taken into account. It is important to remember that since there are measurements taken of the employee databases at two cut points, the analyzed group of companies is seen dynamically. As described in the initial table, the distribution of the cut points is not equal, nevertheless, the analyzed process took place from the 1997-2003 period.

With the purpose of approximating the behavior of the Colombian economy during these years, Graph 10 is included in which the percentage variations of the GDP (Gross Domestic Product) are described.



Source: Banco de la República

Graph 10

This graph shows the volatile behavior of the economy, observing a declining behavior during the first part of the period considered, gaining a decrease of the GDP of 4% in 1999 to later, and gradually, experiencing a certain recovery to position itself for growth of 4% for year 2003.

In general terms a change process is observed in which the “general environment”³⁰ caused different effects on the companies which were studied. The different statistics found, those which have been described in each of the sections of this document, lead us to differentiate this group of 30 companies in terms of their characteristics and behaviors. In order to achieve this, an “analysis by clusters of K-means” was conducted, in which the statistical procedure that allows the creation of homogeneous groups in function of a set of determined variables. From this technique a number of conglomerates emerged. From this process the following two groups were established, whose characteristics are mentioned below and whose observations are basically comparative between the two groups.

4.3.7.1 Medium companies

The majority of companies from the sample, approximately 80%, belong to this first group. The studied time interval is a little over three years. These are growing companies with positive turnover of 21%, whose size of the organization is around 400 employees. The presence of women is important within the total number of employees, approximately 40% of personnel and with an increasing tendency to increase their participation by 15%. In this aspect the companies in this category have displayed a more homogenous distribution of gender, with a clear male predominance. Related to the seniority and length of time with the organization, seniority indicators are observed to be close to seven years, with a tendency to increase in heterogeneity and decrease in permanence. These are the companies that have been growing by hiring more women than men.

³⁰ Jones G. (2004) p. 60.

4.3.7.2 Large companies

This second group is conformed by a fifth of the companies studied. The changes that are described happened in close to two and a half years. These organizations have approximately 2,100 employees, and have been experiencing personnel adjustments, with decreases of approximately 6%. They are companies with a larger female presence, 47% of the total number of employees and with a tendency to increase their participation, but only by 2%. They are also companies with a male majority, but with a more heterogeneous distribution of gender. Related to seniority and permanence, there are companies with higher seniority, close to a nine-year average, and with a tendency to increase their homogeneity. In general these organizations have developed processes of payroll reduction, preferably eliminating men with little experience in the company.

Table 13 summarizes the corresponding figures for this analysis by clusters. It is important to note that only two companies were excluded that, due to their atypical figures, could not be statistically included in either group.

**Establishment of the two groups
Analysis by clusters**

Statistical indicators	Medium companies	Large companies
Conglomerate	1	2
Number of companies	22	6
Size (Employees)	413	2168
Average seniority (Years)	6,93	8,76
CV %	87,88	75,17
Dif CV %	8,52	-1,51
Turnover %	21,2	-6,82
Proporcion females %	40,73	46,67
Variation female participation %	14,83	1,99
Blau indicator	0,35	0,24
Variation Blau indicator %	40,3	3,52
Difference between cut points (Years)	3,32	2,5
Excluded (2 Companies)		

Table 13

4.3.7.3 Final Synthesis

Attempting to generalize, it would be possible to affirm that during the period between 1994 and 2003, this group of companies has developed policies of handling their employee databases in different manners, some ways clearly contradictory, and others with a different emphasis. On one hand, those medium companies, the majority, have increased their number of employees, are predominantly masculine and have significant positive turnover rates, with a tendency toward a slight decrease of their seniority and permanence and an increase in female participation. Their growth has been by preferably hiring women. On the other hand, there are others, the minority, made up by a group of large companies that have been decreasing their number of employees, have a larger female presence, but with smaller increases in their participation. They have higher seniority and stability as well as a tendency to obtain greater homogeneity in their workforce. Their adjustment to the number of employees has been by preferably eliminating men with low seniority in the organization.

<<16 e Conférence de l'AGRH-Paris Dauphine-15 et 16 septembre 2005>>

5. Conclusions and Comments

Following are some general observations and commentaries related to the experience as it has developed. In the first place it is considered that the objective to show the utility of employee databases as valid source of information for organizational analysis has been clearly shown. Despite the fact that only two variables were included, the following useful and relevant results for organizational analysis, nevertheless, could be obtained: establish quantitative points of departure, determine specific characteristics, study several hypotheses, and finally, establish typologies for a determined group of companies. Secondly, the coherence was shown equally between the use of organizational demography as a theoretical element for organizational study and its application by using employee database variables in the companies.

Related to the analysis of the hypotheses subjected to consideration, the conclusions allow the positioning of the studied companies within a more global perspective, as well as to validate elements corresponding to organizational theory. In this sense it is important to indicate that only some of the hypotheses that could have been studied with this same information were handled, signaling only those in which the data showed its possible verification. Nevertheless, those companies for which the hypotheses could not be verified, the conclusions were equally useful from the organizational analysis perspective, as in the case, for example, of the absence of a correlation between size and turnover, while there was a clear relationship found between size and seniority. Related to the accepted hypotheses, it is worth mentioning the significant correlation existing between size and seniority, which permits, on one hand, a reflection on the validity of some of the statements of bureaucratic theory and, on the other, to evaluate the importance of having the organization – in its totality – as a unit of analysis.

An important element to highlight is the usefulness of taking two cut points. This allows the visualization of organizational behavior from a dynamic perspective making it possible to determine tendencies, as well as to construct dynamic indicators as in the case of the difference of the variation coefficient. This is also applicable for the homogeneity/heterogeneity indicator. In this aspect, the complement to the “Blau indicator” by means of the described process, also constructs an important support that facilitates the process of statistical observation.

Related to the description of the process of change lived by these 30 companies, it is considered that an understanding was achieved about the way in which they have developed and the existence of the different forms of logic in the group of these companies regarding the management of their strategies under the same economic situation. They also presented figures that can be compared and complemented in the future to know in a more dependable manner the reality of Colombian companies and their behavior.

Although the results are important, limitations that require future refinement are equally observed. It is the case of the indicators of variability for some of the considered variables that are percentage over percentage, which could possibly include distortions. The case of the variable “difference between cut points” whose measurement is established in years, would be important to observe more continually and monthly, from exact dates. This time difference could possibly influence the behavior of some of the studied variables, as could be anticipated by the results obtained in this present study.

< <16 e Conférence de l'AGRH-Paris Dauphine-15 et 16 septembre 2005>>

The task to realize in the future raises very encouraging possibilities. On one hand, to include the available number of variables in the companies' employee databases, which cover socioeconomic, organizational, and administrative aspects that make up the valuable inputs for future and diverse research. In this sense comparative national and international studies can be developed which enrich the knowledge of the companies in those aspects that cover the measures taken. The level of analysis can also be modified and based on the employee database information made available, study the interior of the organization keeping in mind the location of its structure, its internal mobility, socioeconomic and organizational attributes, all of which makes up a very valuable source of information for future research.

Situated in a more general perspective are the results that contribute to knowing aspects of the labor market, as well as elements of a more contextual and economic character that allow the establishment of explanations of a more structural nature of the observed phenomena, relating the environmental and organizational variables.

Finally, and to the extent to which, administrators, as much as researchers, acquire consciousness of the importance of employee databases as a source of analysis in organizations, they should consider keeping backups of cut-point files in a systematic fashion. This information can be used in the future as a base of the group of indicators that are automatically generated in an ongoing format in the organization, having been able to constitute a valuable source of information for planning and evaluation of organizational strategies.

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Appendix 1: List of companies included in the study

- 1. Banco de la República (Banco Central Colombiano) (Central Bank of Colombia)**
- 2. Central Eléctrica del Norte de Santander (CENSA)**
- 3. Codensa S.A.**
- 4. Chaneme S.A.**
- 5. Empresa de Acueducto y Alcantarillado de Bogotá (Water company of Bogotá)**
- 6. Interconexión eléctrica S.A. ISA**
- 7. Instituto de Medicina Legal (National Institute for Legal Medicine)**
- 8. Empresa de Energía de Bogotá (Electric Company of Bogotá)**
- 9. Empresa de Energía Eléctrica Occidente**
- 10. Empresa Energía Eléctrica Santander**
- 11. Ministerio de Hacienda y Crédito Público (Nacional Finance Ministry)**
- 12. Fondo financiero de proyectos de desarrollo Fonade**
- 13. Empresa prestadora de salud**
- 14. Profamilia IPS**
- 15. Servicio de salud Cafam**
- 16. Compañía Colombiana de Seguros. Colseguros**
- 17. Colsánitas S.A.**
- 18. OPGráficas**
- 19. Colpatria**
- 20. Universidad Sergio Arboleda**

- 21. Almaviva S.A.**
- 22. Purina**
- 23. Autonal S.A.**
- 24. Odinsa S.A.**
- 25. Empresa de pegantes**
- 26. Dyetrón S.A.**
- 27. Empresa de alimentos**
- 28. Financiera de desarrollo territorial. Findeter**
- 29. IMME Financiera**
- 30. Empresa de comunicaciones**

Appendix 2: Data table: Second cut-point for all companies

List of companies
Basic variables
Second
measurement point

	N	Average	Standard deviation	Proportion females	Blau indicator
Company 01-2001	2930	11,96	7,36	24	0,52
Company 02-2002	850	5,71	9,29	32	0,36
Company 03-2003	94	4,63	5,36	33	0,34
Company 04-2001	2774	14,63	6,32	36	0,28
Company 05-1999	443	13,84	7,28	16	0,68
Company 06-1997	58	2,71	2,48	44	0,12
Company 07-2001	944	10,66	7,32	22	0,56
Company 08-2000	2573	4,79	4,68	58	0,16
Company 09-2003	1653	4,58	3,89	55	0,1
Company 10-2001	1664	6,95	7,18	63	0,26
Company 11-2002	63	3,92	3,18	44	0,12
Company 12-2000	88	2,74	1,78	29	0,42
Company 13-2003	732	3,79	2,20	6	0,88
Company 14-1999	151	8,17	6,89	37	0,26
Company 15-2001	406	14,75	7,23	16	0,68
Company 16-2001	249	9,75	5,49	34	0,32
Company 17-1998	276	3,28	2,82	47	0,06
Company 18-2001	82	5,24	6,18	45	0,1
Company 19-2000	119	2,96	1,65	44	0,12
Company 20-2000	1245	3,40	5,97	77	0,54
Company 21-2002	833	13,74	7,50	28	0,44
Company 22-2003	1416	9,64	5,81	44	0,1
Company 23-1997	767	10,71	8,34	53	0,06
Company 24-2003	175	2,33	2,45	68	0,36
Company 25-2002	333	6,94	5,02	33	0,34
Company 26-1997	73	4,14	3,76	49	0,02
Company 27-2001	83	9,14	6,52	69	0,38
Company 28-2003	874	10,01	8,13	73	0,46
Company 29-2000	58	4,14	6,17	44	0,12
Company 30- 2000	228	3,82	3,16	46	0,08