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A MULTIDISCIPLINARY APPROACH TO WORKFORCE DYNAMICS

The a2a case study

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PhD candidate: Nicole Casanova

Supervisor: prof. Luca Solari
PhD program coordinator: prof. Lorenzo Bordogna

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Introduction

During the past twenty years, processes of change have interested both organizations and people working inside them. In particular, while in the past an individual would spend all his/her career inside a single workplace, today career paths are less predictable, and usually workers experience different work settings through their life (Diebold *et al.*1997, Jaeger & Stevens 2000, Kalleberg *et al.* 2000, Rosenfeld 2001).

This can be attributed to both the demand, and the supply side of the labor market. From the modern organizations point of view, the contextual environment in which they develop their business is constantly changing and characterized by a high level of competition (Baruch 2006). Hence, they are asked to innovate, and distinguish themselves by their competitors. On the other hand, from the point of view of the supply side of the labor market, a lot of changes occurred. First of all the level of education has incrementally increased in the majority of the economically developed countries, creating a highly skilled labor force. Moreover, a new segment of the labor market is now composed by the growing number of women. Finally, the general raise in life expectancy rates entails a new and unexplored challenge for human resource managers, both in terms of management of old age workers (given that also the time of retirement as been extended), and succession plans. (Jackson & Schuler 1990).

This situation is even more complicated if we consider the fact that the above mentioned technological innovations and the competitive context creates difficulties to develop replacement policies as they were conceived in the past, when positions requirements were relatively stable, and career paths reasonably well-defined (Jackson & Schuler 1990). It follows that today long term plans of human resource planning are complex to be elaborated, because the unpredictability of the external forces that indirectly influence organizations and their human resources. However, the need for realizing business objectives, together with budget constraints, force managers to deeply consider coherent plans of management and development of their workforce,

also from a technical point of view. A two-way linkage is necessary, in that business plans are influenced by human resource considerations (in terms of cost and availability of labor), and at the same time profitability requires that business objectives should be linked to people-planning activities – given that if the right people are not available, goals cannot be met (Mills 1985a).

This is the reason why in the present study we decided to adopt a multidisciplinary approach to workforce dynamics inside organizations.

Our case-study is the a2a Group, a company that originates in 2008 from the merger process of some Italian public utility firms.

In particular, the purpose of our research is to understand which are the determinants that influenced the workforce management within this company, taking into consideration both its historical background, and the specific characteristics of the business area in which it operates.

In order to reach our goal, in Chapter 1 we will illustrate three approaches developed by the organizational studies literature, that deal with the human resource management.

In particular, the first stream of research is the "internal labor markets", that takes into consideration the criteria responsible for the workers' job movements within firms.

On both a macro and micro perspective, the second approach named "organizational demography" focuses on the processes that interest employees turnover dynamics within firms (intra-organizational demography), and among them (inter-organizational demography).

Lastly, the third group of studies illustrates programs of human resource planning that have been implemented during the last years, within both the public and the private sector. Contrary to the previous literature contributions, it deploys an evidence-based approach, that given certain circumstances, suggests and elaborates strategies aimed at facing problems linked to the human resource management.

In this respect, the dataset at our disposal on the a2a workforce concerning the years from 1952 until 2012, allows us to make some statistical analyses able to describe career paths inside the company. The dataset composition, the variable characteristics, and the different subsamples analyzed, will be the object of Chapter 2.

At this purpose, a research question, and five research hypotheses will be enunciated within the same chapter.

Afterwards, the complete analyses will be elaborated in Chapter 3, where we approach the issue using different models of analysis. First of all, Kaplan-Meier survival curves will give us a picture of the historical promotion trends that characterized the company. Secondly, Cox models will show the probability of certain promotions occurrence, and their relationship with some individual variables.

Finally, in the conclusions we try to respond to our research question, illustrating the research findings emerged by the analyses.

Further, limitations of the present study will be depicted, and some suggestions for future research illustrated.

Chapter 1. Literature Review

1.1 Internal Labor Markets

The theory of internal labor markets postulates that many available opportunity sets within the national pool of jobs have restricted ports of entry, and mobility and wages are determined by internal systems of rules. Moreover, different internal labor markets operate at different levels of analysis – organizations, industries, and occupations – with varying degrees of openness toward the external labor market (Konda & Stewman 1980).

In the following sections we describe which are the origins of the internal labor markets. Then, we illustrate the different interpretations that have been attributed to these systems by the literature. Finally, some new interpretations and applications of this topic in the post-fordist economical context are introduced.

1.1.1 The historical origins of the internal labor markets

The historical origins of internal labor markets can be traced back in the craft unions' system of employment rules, procedures, and protection, designed in order to be directly applied to jobs, and then spanned among firms boundaries (Jacoby 1983).The professional figure of the 'foreman' was the main responsible for the management of employees, with wide discretion in selecting, allocating, paying, and disciplining workers. Costs associated with this unregulated system of employment were high, both in administrative terms, and labor unrest and turnover.

This led to a growth of personnel departments between 1916 and 1920, when they were present in nearly one-fourth of large industrial firms. The main responsibilities of such areas dealt with centralized selection, internal promotion plans, wage

standardization, dismissal restrictions, and workers' retention – that is, an early form of internal labor market.

The situation changed when, during the depression of 1920-1922, strikes and unionism declined. This caused the re-appearance of pre-war employment methods, and the slowdown of the implementation of the new practices in some others. This negative trend was brought to a halt when, during the years of the Great Depression, the proportion of industrial workers employed by personnel departments rose from 19 percent in 1929 to over 70 percent in 1935 (Jacoby 1973). Government intervention was crucial in this phase, in terms of both centralization and standardization of employment procedures inside the firms. At the same time, unions' power increased tremendously. According to Jacoby:

> "It followed that the convergence of personnel management and trade union policies was a basis for accommodation between labor and management" (Jacoby 1973: 279)

Even in face of such evidences, some managers still held a sort ok skepticism toward the fact that internal labor market system could lower costs. At that time in fact, efficiency incentives were not strong enough to produce the modern configuration of internal labor markets (Osterman 1984a).

1.1.2 The concept definition

Once traced back the historical origins, and the consequent development of internal labor market systems, some authors have tried to define the concept itself.

One of the firsts researchers to give attention to this fact has been Dunlop(1966), who defines an internal labor market as:

> "The complex of rules which determines the movement of workers among job classification within administrative units, such as enterprises, companies, or hiring halls. These movements may be transfers, promotions, demotions, or layoffs to the exterior labor market; they may be temporary or permanent, which may affect the operation of the rules" (Dunlop 1966: 32)

Employers in their companies elaborate different 'seniority districts' (Dunlop 1966: 33) in which people are subjected to a certain system of promotion, hiring, transfer, and turnover. These "career paths" represent the criteria by which workers move inside organizations, and they can be either temporary, or permanent. Furthermore, they play a role in the development of boundaries that contribute in separating the internal labor market of a specific company, industry, or labor organization, from the external market.

According to Althauser (1989:144), in this conceptualization an internal labor market is "all jobs in a firm".

Doeringer and Piore (1971) further investigate the subject, emphasize that scope and structure of internal labor markets can differ among industries and jobs.

Their analysis on blue-collar employment in manufacturing focus specifically on the distinction between the internal and the external labor market. The second term refers to the area where pricing, allocating, and training decisions are controlled directly by economic variables. Instead, according to the authors, people inside internal labor markets benefit of some privileged treatments, such as career development, and the protection from external competitors. This phenomenon has been defined as 'industrial feudalism', and 'the balkanization of labor markets'. Ross (1958) describes industrial feudalism as the phenomenon of labor immobilization occurred during the post-war, ascribable mainly to the spread of unionism (and its related processes of voice of protest) and workforce ageing, linked to the wish of workers of keeping the benefits associated to the seniority gained inside the organization. On the other hand, the balkanization of labor markets is taken into consideration by Kerr (1977) who describes it as the process by which the originally self-managed market becomes institutionalized, following both people's preference and the economic system needs.

Contrary to Dunlop definition (1966), Doeringer and Piore illustrate how administrative rules do not establish automatically the existence of an internal labor market. It is the rigidity of the rules that forms the boundaries, given that if rules are

not rigid, their independent economic impact is minimal. According to them, internal labor markets are generated by a series of elements, and in particular: skill specificity, on-the-job training, and customary law.

Skill specificity refers to competences that are unique to a single job classification in a single enterprise – the opposite of general skills, valid for every job in every enterprise. Due the fact that being productive on a job involves familiarity with certain range of instruments, or a set of working procedures that are idiosyncratic to a particular establishment, employers have the economic interest in retaining workers because of the costs associated with their replacement. Policies of seniority-based wage systems are coherent with this approach, in the sense that workforce tenure is usually strongly associated with job expertise (Bernard and Smith 1991).

That said, training is a very important organizational function, in order to transfer competences to the new hired employees in the company. Doeringer and Piore (1971, 1983) make yet another distinction between the on-the-job training adopted by white collar workers, and the one applied to blue-collars. Whereas in the professional and managerial jobs formal education is preferred, for the blue collar positions the on-the-job training is considered very important. Its main characteristic is the informality: new workers learn their work observing the more expert colleagues. It so follows that the on-the-job training is also closely related to job specificity, because it takes place one-to-one (hence focusing on a single learner), and it is strongly related to the context in which it is transmitted.

Finally, a third factor that occurs in the creation of an internal labor market is custom. They define it as

> "An unwritten set of rules based largely upon past practice or precedent" (Doeringer and Piore 1971: 23)

Customs originate from work stability within internal labor markets. The routine that interests people working in the same place, automatically produce some accepted behaviors and subtle rules that are shared by all the members of a specific group. At the same time, those unwritten codes implicitly influence the relationships that the group holds with the outsiders.

The consequence of customs is particularly important because they can create a sort of 'second labor market', partly or completely disconnected from the official or the external one. Rigidity in internal wage policies and allocative structures could follow, and this may represent a problem in case it would be necessary to change this kind of habits. In fact, group customs can intervene in creating skills that reinforce themselves during the time, becoming in this sense a sort of social institutions.

According to Bernard and Smith (1991), Doeringer and Piore introduce this third factor in order to describe the potential differences that institutional contexts and times may produce on the shaping of internal labor systems. In particular, trade unions play an important role in that, as we described earlier, internal labor markets generate egalitarian systems in terms of seniority-based wage policies and job promotion. For this reason, some authors, such Fairris (2004), believe that these structures can be prominent only in segments of the labor market where workers do not hold specific human capital skills. Studying a sample of 471 establishments from the Organization of Work in American Business Survey, Fairris (2004), shows that workers quit rates are lower in companies where job ladders are long, pay growth is high (and it starts from the bottom to the top), and seniority is considered a criterion for promotion. However, contrary to the traditional theories on internal labor markets (see for example Doeriger and Piore 1971, Osterman 1984a), formal training programs are relevant only when they are acquired directly on the job (i.e. the process of learning by observing others' work). Then, following this perspective, internal labor markets can be conceived as a certain range of personnel policies adopted by firms in order to retain a specific share of the labor force – that is the less skilled one – whereas high skill workers are more subjected to mechanisms of competition among companies (Fairris 2004).

Other elements complementary to the skill specificity, on-the-job training, and custom, belonging from the neoclassical economics, can play an influence on the internal labor markets elaboration. From the employers point of view, the importance

associated to internal labor markets by the labor force, the cost of labor turnover (and the role of such markets in the reduction of it), and finally their technical efficiency in the recruitment, screening, and training policies, make these systems a good solution in order to face difficult problems of management and control in complex environments (Williamson et al. 1975). Moreover, due to the impossibility of constantly monitor the workforce performance, and the difficulty in forecasting *at priori* all the tasks assigned to a specific job, the existence of internal labor markets allows employers to reduce opportunistic behaviors, by setting specific rules to which workers are subjected.

Another perspective about internal labor markets focuses specifically on the class struggle between managements and workforce (Doeringer and Piore 1971, Osterman 1984a). According to this view, the existence of such of markets is attributed to both the management's interest in retaining their competitive position with respect to other companies, and the workers' need of protection in terms of employment security and promotion opportunity (thanks to the enterprise-specific skills acquired in their working experience within the same company).

The combination of these two perspective, together with Doeringer and Piore's approach (1971) has been defined by Osterman (1984a: 12) as the 'institutional perspective'. According to the author, notwithstanding the fact that this model could appear as a mere list of plausible factors related to specific situations, it seems impossible to go beyond a rather eclectic orientation toward the origins and functions of internal labor markets. Although these systems actually improve management supervision and retain workers inside the company, there are other actors that may intervene: unions, governments, customs, and cultures play an essential role in shaping labor markets. Moreover, because of the complexity of the issue, Osterman (1984a) believes that it is important to focus also on the variety and change of internal labor markets. In his essay, *White-Collar Internal Labor Markets*, he analyzes four white collars occupations in the Boston area: clerical employees, low-level managers, sales workers, and programmers (Osterman 1984b). Variety is declined by the fact that the internal labor markets are conceived as three types of 'subsystems' within firms:

industrial, craft, and secondary subsystems. The difference among them is essentially due to the characteristics of the ports of entry, and the mobility across the job ladders.

Whereas in industrial subsystems the number of ports of entry is limited, and workers move mainly inside the company in which they have been hired (thanks also to the internal training system), the craft subsystems are more linked to a specific job. This allow craft workers to hold a stronger market position relating to employers, and to show an almost exclusive competence on a certain profession. It follows that the inter-firm mobility can be very high (horizontal mobility). Osterman (1984b) quotes computer programmers and some high-level salesmen represent examples of white-collar occupations that operate under craft subsystems.

The less skilled, and qualified jobs in white-collar jobs are the secondary subsystems. Given their low level of competences, they are easily replaceable, and their career perspectives are almost absent. Mailroom staff and messengers are part of this subset of internal labor markets.

Generally, companies are composed by a mixture of all the three types of subsystems, and this is the reason why, according to Osterman (1984b), internal labor markets are characterized by variety. Their second distinctive characteristics is the capacity of change. Originally, they were conceived as a response to two parallel needs. On one hand, employers wanted to lower the craft subsystems market power, and on the other hand, workers trying to avoid the complete absence of guarantees typical of secondary subsystems. Consequently, the birth of industrial subsystems responded to both these requirements.

During their lifecycle, firms eventually can change their internal labor markets structure. According to Osterman (1984b), this can be due to several factors: disturbance in product markets (for instance, from an industrial to a craft subsystem), shifting labor market conditions, and technological change.

Additionally, variations can occur across firms, mainly due to internal and external environmental variables that intervene in changing the labor market settings. The author mentions the company culture (in the sense of the approach adopted by the

firms in terms of promotions, resources devoted to training, and the preference toward merit or seniority), unionizations, and government regulations as possible sources of such variability. These are some factors that unavoidably play an influence on the internal subsystems, and that cannot be neglected by employers. The difficulty in managing and understanding changes relies on the fact that a wide number of elements has to be taken into account. Furthermore, given the fact that the process of change is constantly happening, scholars are left with an incomplete understanding of the reason behind it, and the motivations why it takes a specific form (Osterman 1984a).

A similar path of analysis of Osterman's has been traced by Alexander (1974). The author adopts Kerr's typology (1954) in order to classify the existing internal labor markets. Respectively, he identifies the 'open markets', unstructured and competitive, the 'guild markets', which predominate in skilled crafts occupations and that usually are highly unionized, and finally the 'manorial markets', with an emphasis on the attachment to the place of work and vertical stratification. His approach is very close to Osterman's (1984b), in that secondary subsystem are similar to open markets, crafts to guild, and manorial to industrial subsystems.

Alexander (1974) makes an interesting proposition as evaluates the relationships between the structure of internal labor markets and the mobility, experience, and income of workers. His analysis takes into consideration both the workers experience within a firm and industry. The source of data is the Social Security one percent work history file. The range of time the decade 1957-1966, and records are composed by information about one million individuals gathered by the Social Security system.

Mobility, experience, and income are endogenously determined, and their measure is calculated through a system of equations. The variables considered are: the probability of moving from the firm (firm mobility), the worker's age, the firm experience, and some other exogenous variables. Both ordinary least square (OLS) and two-stage least square (2OLS) are investigated. His findings point out that the probability of moving results to be strongly related to the type if internal labor market. As suggested by the theory, it is stronger for the unstructured class of industries,

followed by the guild markets, and finally very low for the manorial industries. The impact of age on mobility is relatively minor, and it is reduced by the experience within the firm. Finally, lower-income groups show the falling of mobility with experience, whereas the impact is weaker as the income increases.

The second variable taken into consideration is the workers' experience across the three types of market. This is considered together with the income variable, due to their strong interconnection.

First of all the author analyzes the experience by estimating income as a function of age, experience within firm, and experience in the industry outside the firm (Alexander 1974). Individuals are divided in three classes of income – namely high, medium, and low, and separate equations are estimated for each of them.

Running OLS and 2OLS findings show how, when income class is accounted for, the types of market are barely distinguishable from each other by their equations. Hence, it appears that there is no variation in the relationship between income and experience across types of market, which are different in the composition of the labor force. In fact, high-income workers seem to show an higher level of general training, that can be effective on all the markets. Showing an opposite trait, medium and low income individuals hold a more specific kind of training, which is not transferable among firms without a loss of human capital (Becker 1964). In fact, observing the cross effect of firm experience and age on income, it emerges that, regardless of age, low income classes start at the bottom of the ladder when entering in a new job. Instead, high income can benefit of their general training even in their first year within a new company.

Consistent with the characteristics of the three types of market, manorial industries are heavily weighted in the higher income classes, while an high proportion of the unstructured and guild industries are found in the lowest class. This is due to the fact that, as suggested by Alexander (1974), manorial jobs are the ones in which career paths are internally structured.

Even the dimension of establishments seems to play role in the context described earlier. In fact, large firms are predominant in manorial industries, while guild and

unstructured samples are found in companies with less than fifty employees. Considering that bigger firms are those where unions' influence is usually stronger, the result is coherent with the presence of higher levels of salaries. Furthermore, there is also a self-selection process, for which individuals with a higher level of education will apply more likely for those jobs that allow them to get a better salary and move up on the career ladders.

In conclusion, Alexander (1974) outlines the interrelatedness of the three variables taken into account: mobility, experience, and income. He suggests that given the complexity of the findings, a single theory on the relation among them is impossible to be developed. Additionally, he remarks that the issue is even more complicated taking into account other elements that can intervene. In fact, unions, technology, capital intensity, competition, the bureaucracy of large organizations, and the supply of and the demand for the different kind of human capital – all can play an important role in the shaping process of internal labor markets (Alexander 1974).

The relationship among internal labor markets, the position held in the firm, the number of an employee's promotions, and the employee's final salary has been studied also by Bernard and Smith (1991). Using regression analysis, they try to estimate the impact of these variables on the internal labor markets of a company called "Z", which controls several retail chains and manufacturing firms in Canada and in the United States. Data are collected back to 1987, and concern 114 full-time workers in white-collar jobs. Specifically, the authors are interested in understanding which are the determinants of the job level at which people enter in the company.

Considering equal all the other characteristics, regressions show that minorities and female workers are hired into lower level positions. However, 'merit' has some effect, in the sense that non-white males achieve the largest average promotion distance over the years. The authors suggest that in this context something like an internal labor market is developed. Their assertion is due to the fact that a job ladder exists, and it is characterized by seniority based promotions (despite the absence of unions). This system proves to be efficient because employees who do not quit, could

expect to move up the job ladder, provided that their performance is good (Barnard and Smith 1991).

1.1.3 The role of external actors

As just mentioned earlier, employers and employees are not the unique actors that intervene in the internal labor markets shaping process. Unions and governments might play an important role as well. For instance, Jacoby, Kochan and Cappelli (1984) suggest that the employers' desire of weakening unions, together with workers' quest for a fair treatment, can be at the origins of the elaboration of such systems. Moreover, the employees' need for security, advancement, and due process are traced back as one of the reason why workers appreciate these kind of systems (Elbaum 1984).

From the point of view of governments, the internal labor market regulation favors the rising process of "bureaucratic controls" (Baron 1985). In addition, Kanter (1984), focusing on white-collar internal labor markets of high-technological firms, argues that elements such as the newness, decentralization, and environmental turbulence of the context in which the company run its business, contributes to foster the characteristics of the internal promotion ladders in terms of less formal, specialized, and structured career paths.

1.1.4 New approaches on internal labor markets

In the current debate on internal labor markets, two are the emerging streams of research that try to describe the new development of this structure. Some authors (Abraham 1990, Cappelli 1999, Cappelli *et al.* 1997, Carnoy *et al.* 1997) point out that the growing economic volatility, the rapid technological change, and the intensification of the global competition, have led firms to increase labor flexibility, flatten organizational hierarchies, outsource non-core business functions, and shif to an "employability" model that emphasizes employees' cross-firm mobility (Cappelli

2001, Heckscher 2000). Other scholars, however, believe that internal labor markets still exist, in terms of new career development systems aimed at increasing employees' commitment, provide motivation, and capture returns of investments in specific training. In light of this perspective, the retention of talented people plays an important role also (Levine *et al.* 2002, Moss *et al.* 2000, 2008).

According to this second perspective, Moss *et al.* (2008) studying inbound call centers in fourteen businesses, conclude that there has been a process of deconstruction of internal labor markets, followed by a rebuilding development. The outcome is a new form of retention and promotion structures, aimed at attracting and retaining talents, and motivate employees in order to provide good customer service.

The authors believe that this is partially a consequence of the organizational change that have interested these businesses, leading call centers from flat to more complex organizations. Consequently, it emerged the need of integrating a substantial part of the workforce *via* internal labor markets, taking into account both cost cuttings constraints, and service improvements.

The natural outcomes have been continuous processes of mediation between managerial beliefs and worker preferences, which are unlikely to be unidirectional and permanent. Instead, as Moss *et al.* (2008) suggest, call centers internal labor markets are going to deal with multidirectional, iterative, and provisional job structure changes.

A third additional perspective assumes as a starting point the fact that today firms are organized differently from the past. Instead of talking about a single establishment or enterprise, we are often dealing with networks that spread across firm boundaries. Here, separate business units are managed and evaluated separately, with largely autonomous decision making processes.

On this issue, Benner and Mane (2011) submitted a survey to 1760 employees of call centers belonging from sixteen countries. The aim of their research is to understand whether there are differences between vertical promotion opportunity *versus* promotion or mobility opportunities across business units within a firm. Furthermore, they want to discover to what extent traditional models that explain the

prevalence of internal promotions apply in these firms. They do so both within and across countries. Among the variables analyzed there are human resource practices and work organization and complexity, while as control variables they check for markets and organizational and workforce characteristics.

They run several models to test their hypotheses, and in particular the Tobit model, and a bivariate Double-Hurdel model. Results show that through the usage of HR practices, employers in call centers are able to make qualitative assessments of their employees' performance – such as supervisors listening employees' calls, and team work and quality improvement circles. This allows the development of job promotion paths both internally and externally the call center. Such evaluation systems that depend on more quantitative assessments of workers' performance (i.e. number of interactions with customers, average number of calls, etc.) are related to internal promotions only. Finally, for what concerns the work complexity, they find out that indicators of more general skills are related to external promotions, whereas the ones linked to the level of complexity of call center specific skills play an impact on internal promotions only.

In their concluding remarks, the Benner and Mane (2011: 349) suggest that the 'network labor markets' may be operating internally to firms. Moreover, HR practices, work complexity, and organizational characteristics that affect the structure of promotions and transfer across these network ties, may differ substantially from opportunities forms of promotion within business units.

Changes in firms structure and network is an important trait also because of the associated implications on the determinants of wage policies. The classical internal labor markets perspective assumes that workers' salary is directly linked with seniority inside a firm (Doeringer and Piore 1971, Osterman 1984a, Althauser and Kalleberg 1981). In the Post-Fordist era characterized by flexible jobs, increased reliance on the external market for the provision of goods, services, and skills, and high job mobility, this kind of systems are no longer in place. Hence, some authors argue that there has been a process of internal labor markets 'devolution' (Noyelle 1987).

Di Prete *et al.* (2002) investigate this issue by analyzing data from the Current Population Survey (CPS) on wage profiles. They estimate three sets of equations. First, they elaborate separate models for workers in the high-technology industry sector, and for workers in other industries, later, analyzing the trend in effects of tenure and general labor force experience between the early 1980s, and the late 1990s and finally, estimating trends using models that correct for possible selection bias.

The results demonstrate that today tenure is no longer a determinant of the earning structure. Salaries are instead influenced by the substantive skills and experience in the occupation that an incumbent worker shows, *prior* to join the firm. Differently from the past, where specific skills were fundamental in order to get promoted (let's recall for example craft markets, and manorial industries), today general experience is valuable for both external as well as by the home firm. It follows that wage gains may be realized through mobility within or between firms. The discriminant element relies on baseline earnings, that privilege worker with more general experience.

Di Prete's interpretation is that a shift in the structure of internal labor markets took place, with movements up to the job ladders associated with specific skills and on-the-job training, no longer being the determinants of the internal wage structure of a firm (Di Prete *et al.* 2002).

1.1.5 The internal labor markets. Concluding remarks

As it was demonstrated in the prior sections, the amplitude of approaches adopted by the literature on internal labor markets has brought some authors to define it as 'conceptual potpourri', and to question the reliability of this theory.

In particular, internal labor markets have been described first as set of rules responsible for the movements of workers within administrative units (Dunlop 1966), then the focus has shifted to the mechanisms that implicitly or explicitly govern the human resource policies adopted by firms. In this regard, Doeringer and Piore (1971)

emphasize characteristics such as the skill specificity, the on-the-job training, and customary laws that would be responsible for these systems.

An important contribution to the issue has been given by Bernard and Smith (1991), who outline the importance of the contextual factors that can play a role on the shaping process of internal labor markets.

Additionally, some authors pointed out that such systems are not static, but can change over time in response to several factors, such as the technological change, unionization, and government regulations (Osterman 1984b). In this view, today internal labor markets involve also the network of firms, and not only the "traditional" organizational configuration.

In the present study we decided to illustrate internal labor markets theories because our main concern is on discovering how workers are managed inside companies, considering the critics and remarks provided by Althauser (1989), Baker and Holmstrom (1995) works, and taking into account the logics and the system of rules that lie behind the human resource management are fundamental in order to understand how an organization worked in the past, and gives a good prediction on how it will look like in the future.

In the next sections we are going to describe two other theories concerning internal workforce management – respectively the internal organizational demography, and human resource planning. Our scope is – given the past findings by current literature on the subject – to elaborate an integrated human resource management model within which it will be possible to analyze the company of our interest and elaborate future scenarios on its workforce configuration.

1.2 The Demography of Organizations

In the previous paragraphs we described organizations as systems in which one or more internal labor markets may operate. For our research purpose, we decided to adopt Fairris' conceptualization of internal labor market, that defines it as the set of features ascribable to a firm, that show some specific attributes, and in particular:

> "The extent to which job vacancies in a specific family of jobs are filled from within, whether seniority is an important criterion for promotion in such cases, the average length of time it takes someone to move from the bottom to the top of the core family job ladder, and the pay level at both the bottom and the top of the ladder". (Fairris 2004: 578)

Following this line of thought, some authors approach the issue comparing organizations to natural systems, where several events occur during the evolving process of their lifecycles (Carroll & Hannan 2000, Stewman 1988). The human resources constitute the organizational demography of a firm, which has been depicted in different ways by the literature.

Initially, Carrol and Hannan (2000) present a distinction between three different units of analysis: the demography of corporation, of the workforce, and the internal organizational demography. In this context, the term 'corporation' refers not only business firms, but also the set of corporate entities embodied in the formal organizations and associations. Additionally, the domains in which corporations operate are named 'industries' – in a single industry a mix of populations of corporations can coexist. Hence, the demography of corporation concerns the events of founding, growth, decline, transformation, and mortality of a corporation.

The demography of the workforce is instead the study on a focal organization, and its turnover and mobility, whereas the internal organizational demography concerns:

> "The composition, in terms of basic attributes such age, sex, educational level, length of service or residence, race and so forth, of the social unit under study" (Pfeffer 1983)

In this section, we illustrate the different analyses developed on the internal organizational demography field. Our interest is based in that, once we depicted the internal labor markets theories on the management of the workforce, we believe that the organizational demography could be interpreted as an economic shade on these issues.

Organizational demography scholars specifically focus on the variable of workforce tenure, as an instrument to understand the ways in which an organization performs in the market. The internal labor markets theories instead, provide an interpretation on the reasons why these variables can be used as an investment from the employers point of view.

Our purpose is to understand which are the strategies that performed well in the past, taking into consideration a single organization lifecycle, in order to plan the future human resource practices to be implemented.

Organizational demography concepts have been deeply studied by scholars from different points of view. In this regard, Stewman (1988) in his article *Organizational Demography*, traces a clear typology of the approaches adopted on the issue, investigating four particular areas: the intra-organizational demography, inter-organizational demography, individual careers, and organizational and external populations.

In the following section we will focus on the intra-organizational area, presenting some information on the other the other three research lines. Our goal is coherent with the aim of the present research, which is to understand the internal organizational dynamics in order to develop plans of human resource needs.

1.2.1 The intra-organizational demography

According to Stewman (1988) two of the more important contributions to the literature on the organizational demography are provided by Pfeffer and his associates (Pfeffer 1983, Pfeffer & O'Reilly 1987, McCain *et al.*1983, Wagner *et al.* 1984), and Stewman and Konda (Stewman 1978, 1986a, 1988; Stewman & Konda 1983).

In this first section we illustrate the demographical aspects that interest people inside the organization, starting our review showing the effect of cohort and group dynamics on the turnover rate. Next, we take into consideration some variables related to individuals, such as the date of entry in the firm, and the date of birth, searching to clarify if they can affect the social processes inside the work place. In some cases, a specific professional level (usually top management) is analyzed.

In the final section, we are going to deal with the intra-organizational demography from Stewman and Konda's perspective – that is the demography of jobs – with the aim of creating a "bridge" between the opportunity structure and the internal labor markets theory.

1.2.1.1 The turnover dynamics

As we mentioned earlier, there are two main streams of research on the intra-organizational demography. The first aims to understand the ways in which these variables influence individuals' behavior within organizations, and the consequent decision of staying or quitting, focusing primarily on the dynamics concerning turnover rates, from both the individual, group, and cohort point of view (Pfeffer 1983, Pfeffer and O'Reilly 1987, McCain *et al.*1983, and Wagner *et al.* 1984).

Pfeffer's article (1983), *Organizational Demography* represents a corner stone of the topic. The author illustrates which can be considered causes and consequences of demographic phenomena in organizations. In particular, he focuses on variables as the

length of service (LOS) of all the organizational members, or specifically of the top management team. His hypothesis is that the organization's demography, defined in terms of LOS, is a function of several variables – as for example the organization's rate of growth, technology, personnel practices, and the level of unionization.

This reminds us back to the first conceptualizations of internal labor markets, that according to Doeringer and Piore (1971), Alexander (1974), and Osterman (1984a, 1984b), are affected by similar factors such as the training systems, unions, technology, capital intensity, competition, and the bureaucracy of large organizations. Hence, the internal organizational demography seems to depict in a certain way the same structure of the internal labor markets, conceived as systems where employees develop specific skills, and employers retain their workforce in order to maximize their investment on training. The difference between the two approaches is that whereas in Pfeffer's (1984) analysis the focus is primary on workforce tenure as variable that can affect several organizational outcomes, in the internal labor markets interpretation the authors' attention is mainly on human resource practices. However, in both cases, the employers' final scope is to maximize profit, even though in the internal labor markets theories a special attention is dedicated to sociological aspects of employment systems.

One additional aspect that has been considered as influencing the turnover rate is the cohort effect. Taking into consideration different populations, McCain *et al.* (1983), Pfeffer and O'Reilly (1987), and Wiersema and Bird (1993) show that the heterogeneity in the cohort composition of the internal workforce plays an impact on turnover dynamics. The samples analyzed are respectively the academic departments of a large state university, nurses of 732 hospitals, and 40 public companies in Japan. The main finding is that organizations with a dominant cohort, or large gaps between cohorts, might generate internal power struggles and conflicts, which can be responsible of a higher turnover rate.

Going further on the internal dynamics that can play a role in the turnover rate, but also taking into consideration the individual perspective, Wagner *et al.* (1984) study the link between organizational demography and turnover in top-management groups.

By individual characteristics, the authors mean aspects such as the date of entry in the firm, and the the employee's age. Furthermore, due to the fact that a single organization can represents a unit as a whole in which the relationships among groups are incorporated, even the group-level can be considered a unit of analysis itself.

In this sense, background assumptions are based on the hypothesis that persons who are more similar to others in the group in terms of age and date of entry, are less likely to leave with respect to the ones that become part of the workforce much earlier or later.

The authors also identify two different mechanisms that operate in the organizational context. From the individual point of view, similarity in age implies the sharing of needs and aspirations. Hence, people that are of the same age are more connected to each other, and consequently less willing to leave.

Similarly, at the group level, the date of entry can be the beginning of processes of communications and integration in the organizational settings, that can lead to the creation of social boundaries. That means that people more connected are expected to stay in the same organization.

In order to test their hypothesis, Wagner *et al.* (1984) run correlations and multiple regression equations on a sample of 500 manufacturing firms selected from the 1976 Fortune, ranking among the largest enterprises in the U.S.

Initially, it was tested if firm performance is associated with turnover and size of groups. The basic assumption is that big groups should manifest an higher level of internal heterogeneity. Unevenness of the workforce should in turn be a premise of turnover, as well as the age of the firm (younger firms manifest less dispersion among dates of entry in top-management professional levels).

Findings show that performance is negatively associated with turnover and confirm that assumptions at both levels are true. Top management groups are more likely to leave when the date of entry in the organization is different among group

members; at the same time, firm performance positively affects the willingness to stay. Furthermore, taking into consideration the individual level, younger managers that work in best performance firms, and that are less dissimilar in term of age, are the ones whose likelihood of leaving is lower.

Following this path, O'Reilly *et al.* (1989) studies on group demography, social integration of the group, and individual turnover, using data collected in 1979 from employees of a large convenience-store chain, find out that heterogeneity in group tenure is associated with lower levels of group social integration which, in turn, is associated with higher levels of individual turnover. Questionnaires were sent to people belonging from 25 work groups, responsible for servicing outlets within a specific area, which occupied the same job position and were responsible of the same set of tasks.

The background hypothesis was that demographic homogeneity in groups should be positively associated with social integration, and that higher levels of social integration in work-groups implies lower levels of individual turnover.

Findings supported the assumptions, in that group-level tenure homogeneity results to be associated with lower turnover rates of individuals, with group-level social integration as a moderator. Additionally, this process is not merely the aggregate of individual-level processes, since individual level social integration does not affect the turnover rates. In fact, age demography plays a crucial role both at the individual and at the group level affecting turnover rates directly – individuals in an age-heterogeneous group have higher turnover rates, as do individuals distant in age from an otherwise homogeneous group.

Other approaches (e.g. Smith *et al.* 1994) try to combine Wagner and O'Reilly's findings, elaborating three alternative models that contribute to explain organizational performance.

The first one is a demography model in which team demography accounts entirely for firm performance. The second, named 'process model', tries to link organizational performance to social psychological aspects inherent to group dynamics. Finally, a

third ‘intervening model’ considers the top management team demographic characteristics as the main responsible for performance outcomes on process.

Team size, tenure and heterogeneity are also taken into account as variables in the demographic model, whereas social integration, informal communication, and communication frequency in the process one. The sample is composed by data from 53 high-technology firms, focused on the top management team of a set of single-business, technology-based companies.

The models are tested using hierarchical regression and path analysis. Findings demonstrate that the top management team’s demography is indirectly related to performance through process. Moreover, process shows to be directly related to performance, although direct effects of team demography on performance are also found. This seems to support the validity of the intervening model, in that process variables intervened as a mediator of the relationship between demography and performance. Even the process model is confirmed by the results, in that demography and process affect performance separately.

Some of the afore mentioned top management teams’ demographic characteristics, are also studied by Bantel and Jackson (1989) in a sample of 199 banks. Their findings show that the more innovative banks are those in which the teams’ components are more educated staff, that come from different backgrounds and areas of expertise. The same results are confirmed even when organizational size, team size, and location are controlled for.

Concerning the relationship between top management composition and firm performance, and taking into account also the environmental conditions, Murray (1989), Haleblian and Finkelstein (1993), and Keck (1997) point out some interesting connections.

In his study on a sample of 84 Fortune 500 food and oil companies, Murray (1989) reveals partial support for the hypothesis for which homogeneous top management groups should interact better when the competition is intense, while heterogeneous

groups would be preferable under conditions of environmental change, because of their adaptation skills. At the same time, the author outlines the difficulties in tracing the explanations that could be considered as responsible for firm performance.

Following suit, but finding a stronger support to the initial hypothesis, Heleblian and Finkelstain (1993) illustrate how the presence of larger top management teams leads to better firm performances when the environment is challenging. Simultaneously, an organizational context in which the chief executive has a dominant approach toward the managerial conduct brings to worse organizational attainments. Moreover, if the top management team is short-tenured and heterogeneous, thanks to the presence of problem solving skills and new perspectives of its components, the firm can gain better results (Keck 1997).

1.2.2.2 The demography of people and jobs

The second main approach on the intra-organizational demography is the one adopted by Stewman (1978, 1986a, 1988) and Stewman and Konda (1983). The focus here is on two population types: the one constituted by the people, and the population of jobs.

Considering the first point of view (population of people), the starting point is that individuals may decide to leave the firm in which they are working in for several reasons: when the external labor market offers opportunities of better wages or employment conditions, as suggested by Mach and Simon (1958), or when the internal promotions system doesn't provide feasible career paths. This second option has been investigated by Young (1971), who introduced the 'principle of fairness'. According to the author, people inside firms elaborate expectations on the basis of the past promotion policies applied to other employees. When the number of vacancies decreases, and consequently the possibility of being promoted drops, people more likely may decide to leave. Konda and Stewman (1980) show the empirical validity of these statements. Starting from the internal labor markets assumptions on mobility and

wages in organizations, they raise the question of what governs individual movements within these systems. They develop two Markovian, and one vacancy model in order to understand which can be the causes of individual mobility inside a company. Two types of decision-makers are depicted – managers, who select individuals to be promoted (both from the external labor market, or internally), and workers deciding to stay or to leave. An additional element, called 'growth', includes the number of new jobs available. Individuals are analyzed according to their seniority within a single work level.

The first is the 'Opportunity Labor Demand' (OLD) model. It postulates a stable organizational level process of internal flow, rather than a stable individual set of promotions. Given the number of promotions, the chances of an individual to be promoted are determined by growth, managerial selection rules, and worker exit decisions. The second is a Markovian model, called 'Duration Markov Chain' (DMC). It assumes a constant promotion probability for each seniority level, valid for all work levels without distinctions. Finally, the last model is the 'Organizational Markov Chain' (OMC) or Constant Push Model. Whereas the DMC model allocates promotions and exits in proportion to the supply at the individual seniority level, the OMC is a more stable process collocated at the organizational level with stationary promotion rates. In this model, the simple Markovian chain is modified in order to specify internal selection. The author assumes that, though the internal movement is Markovian when all the work levels are considered together, it is no longer Markovian at the seniority level. It follows that there are specific promotion probabilities for each level and that promotions chances vary over time in response to the distributions of seniority in the promotion pool.

Once described in detail the three models, and their background assumptions, Konda and Stewman (1980) present comparative tests according to which the vacancy-driven model (OLD) is the more accurate in predicting person flows for both short and long term predictions, supporting the view that managerial choice and vacancy processes need to be accounted for models of organizational labor mobility.

The Opportunity Labor Demand approach give us the opportunity to elaborate some drawbacks in order to relate the intra-organizational demography with the opportunity structure postulated by the internal labor market theory.

In a nutshell, according to Doeringer and Piore (1971), the main assumptions on the existence of internal labor markets are the following. First of all, organizations are composed by mobility clusters in which people can get promoted, demoted, or transferred. A second statement takes into account the fact that managers are more willing to promote people internally, instead of hiring new employee from the external labor market. Finally, the allocation of people inside an organization is based on seniority, when dealing with blue-collar, clerical, and technical profession, whereas on performance for professional and managerial positions.

The point of connection with the just described Opportunity Labor Demand model is self-evident, in that it clearly depicts a situation in which an internal chain reaction of job opportunities is at stake, when managers iteratively fill vacancies with internal candidates before choosing external ones.

However, as we have already anticipated, Osterman (1984b) and even Stewman (1988) demonstrate how the axiom of mobility cluster is neglected in favor of more cross-over movements among jobs. Moreover, the criteria of internal people allocation seem to be based on different principles. Stewman and Konda (1983) and Stewman (1988) illustrate seniority-performance, and vacancy mechanisms. In the seniority-performance system, promotions are granted to individuals who reach established levels of seniority, experience, ability, performance, etc. Conversely, in the vacancy mechanism, the staffing decision implies a job or occupational change for internal candidates, and hiring decisions for the external ones. It may also include promotion, demotions, and transfers.

The two systems are not self-excluding, in the sense that they can operate at the same time, in the same organization, and often in the same internal labor market.

This bring us to the second subject treated in this section: the demography of jobs. The main contributions on the topic has been given by Stewman (1988) and Greene

(1982), who distinguish among job evolution, job cutbacks or deaths, and technological change.

The three issues are strongly related, given that the evolution of a job may imply the death of the previous one. Usually, when a job evolves, even the person that covers that level is promoted. Moreover, job deaths and cutbacks can be due to technological change, with the abolishment of certain kind of jobs, followed by the creation of new ones.

1.2.2 Other approaches on organizational demography

Scholars interested in the demography of corporations are not focused solely in the analyses of staff flows inside and outside single firms. Other three streams of research concern the inter-organizational demography, individual careers, and organizational and external populations.

As the name suggests, inter-organizational analysis focuses on the labor force movements among firms, and inside/outside the labor market. Mobility processes are studied at the national level (see for the German case: Carrol and Meyer 1986; for Japan: Koshiro 1983, Koike 1983a, 1983b), indicating that there are national chain reactions of job vacancies linking organizations together. The variables considered are several – the frequency of turnover, the movements of workers between small and big firms, and the age of workers who move.

In the individual career stream instead, we are dealing with analysis concerning the single workers' opportunity structure inside firms. The factors considered are the same that in the inter and intra organizational approach, but the unit of analysis is the single individual, rather than firms (for a detailed review of analysis on individual career, see Stewman 1988).

In conclusion, organizational and external population concern individual that are not part of the labor force. The organizations of interest include educational, criminal justice, health, and voluntary associations. The topic considered are wide: movements

among schools, age distribution of criminal behavior, social disability, and estimated time risk of residing in a nursing home (Stinchcombe *et al.* 1967, Blumstein *et al.* 1980, Hirschi and Gottfredson 1983, Branch and Jette 1981, Jette and Branch 1981, Liang and Tu 1986).

1.2.2.1 The relational Demography

Recently, scholars on organizational demography turned their attention toward issues related to the relational aspects of life within organizations (McGinn and Milkman 2011, Shenhav and Haberfeld 1992, Søresen 2004).

In particular sex discrimination, and racial composition are two of the more discussed topics. Their goal is to uncover which of these variables can have an influence on the people's decision of staying or leaving the company.

Søresen studied the workforce composition of a large multidivisional financial service institution, getting data from annual personnel files from the 1st of January 1996 until the 31st of May 1999, and focusing on the determinants of voluntary leaving, in an effort to explain the role that racial segregation plays in turnover decisions, discovering that the effects of group racial composition on turnover are path dependent.

Previous literature findings on social categorization theory and similarity/attraction seemed to demonstrate that the attachment to the employment relation should increase when the number of coworkers of the same race raises. Contrary, Søresen (2004) shows that employees are more sensitive to losses. The impact on the propensity of leaving is stronger when a colleague of the same minority group leaves the company, and the effect is not compensate when an additional member of the same race is hired. Il follows that problems of segregation cannot be easily solved with a multicultural hiring policy, in that an imprinting effect on the organizational story of racial composition may holds in people's mind.

McGinn and Milkman (2011) elaborate the work groups relational aspects inside organizations from both a gender and race perspective. According to Søresen (2004), they believe that the previous theories on social cohesion and social comparison are reductive in explaining group dynamics. They analyze the workforce of a top international law firm that employs 589 professionals in its U.S. offices (whose 60% are junior attorneys), finding out some very interesting results.

When social dynamics are taken into consideration, the mechanisms at stake are different if we observe relationships among colleagues, or between superior and subordinate. This finding holds from both a gender and a racial point of view. The authors motivate these results asserting that whereas social identification with the same sex and race supervisor stimulates positive social comparison in junior workers' perspective (diminishing their propensity to leave the firm), the opposite is true as far as the same-level employees are concerned. In this latter case, belonging from the same minority group seems to provoke a negative social comparison, due to possible mechanisms of internal competition.

1.2.3 Concluding remarks on the organizational demography studies

In this second part of our literature review we dealt with the demography of organizations, paying special attention to the internal organizational demography, in an effort to understand what are the dynamics that govern the workforce movements inside and outside companies. In fact, the knowledge on past trends allow us to develop a first imagine of what can be the future characteristics of the organization we are interested in.

Based on the specific analysis of what happened in the past, we are now turning our attention toward the human resource planning systems that have been studied by scholars, aimed at forecasting the future HR needs inside organizations.

1.3 Human Resource Planning

Before we illustrated the theoretical perspective that describes job movements inside and among firms, referring to is as 'internal labor markets'. Afterwards, we introduced a second approach – the organizational demography – that deploys some empirical ways of studying the workforce's turnover dynamics. Here, we depict a third stream of research, called "Human Resource Planning", that differently from the others, takes as a point of departure the managerial view. We should remember that our scope is – given the characteristics of a specific organizational context, and the logics that govern its labor force internal mobility and turnover – to develop a multidisciplinary approach in order to study the past internal workforce dynamics with the aim of depicting some possible scenarios on how they might appear in the future.

On this purpose, the human resource planning deals with:

> "The process by which management determines how the organization should move from its current manpower position to its desired position. Through planning, management strives to have the right number and the right kinds of people, at the right place, at the right time, doing things which results in both the organization and the individual receiving maximum long run benefits" (Vetter 1967: 15)

The primary focus of HR planning is to incorporate forecasts about types and numbers of workers who will be needed to meet organizational long-term demands, taking into consideration various HR practices such as career development, executive training, external recruiting, succession planning, employee appraisal, and retirement plans (Lam and Schaubroeck 1998).

However, despite the perceived importance of the subject, very little empirical research has been undertaken to determine how such planning is actually being carry out by organizations.

Following sections will describe, at first, all the historical developments of human resource planning practices. Next, it will report some empirical cases of application of

these plans in the field of both the public and the private sector. Finally, some considerations on the level of application in the organizational context of this kind of plans are presented.

1.3.1 The historical development of human resource planning

Human resource planning was first developed during the 1940's, when the need of reporting on expected staffing levels and requirements to prevent shortfalls in skilled workers brought to the creation of the World War II War Manpower Commission (Cappelli 2009). The emergency situation and possible workforce shortages lead to the spread of manpower planning functions in personnel departments in around the 96% of corporations by the mid-60s. The purpose of these systems were to fulfill vacancies from within, recurring to plans of development directed to the internal supply of candidates. The peak of such models was achieved with the "MANPLAN" program, where individual behavior and psychological variables such as workers attitudes and aspirations, the human resource practices adopted by supervisors (appraisals, compensation arrangements, etc.), and group dynamics, were implemented in the planning systems in order to forecast workers' mobility within the internal system of career.

The oil crisis in the mid-70s and the consequent impossibility to predict the overall level of demand in the economy, caused the decline of human resource planning practices. The stagflation and the following recession during the 80's contradicted the manpower forecasts built in the 60's, based on previsions of economic growth. While about 30% of employers used elaborated statistical regression models to forecast talent needs in 1978, this practice fell to only 9% by 1984; the same decreasing trend held for Markov Chain vacancy models, that from 22% declined to 6% and for operation research tools (from 23% to 4.5%) (Cappelli 2009).

For more than a decade following the 1981 recession, the priority in most company was to restructure and get rid of talent. Planning was no longer necessary,

until this excess of labor supply evaporated with the end of the economic expansion, and a new approach on planning was developed.

Today, contemporary human resource planning is primarily conceived within the broad context of organizational and strategic business planning (Jackson & Shuler 1990). Its aim is no longer exclusively forecasting future human resource needs, but the development and implementation of programs directed at improving employees' performances, or at increasing employees' satisfaction and involvement (Mills 1985b).

1.3.2 The four phases of human resource planning

According to Anderson (2004), Brian and Oldridge (2009), Cappelli (2009), and Jackson and Schuler (1990), human resource planning essentially involves two parallels types of forecasts in four distinct phases:

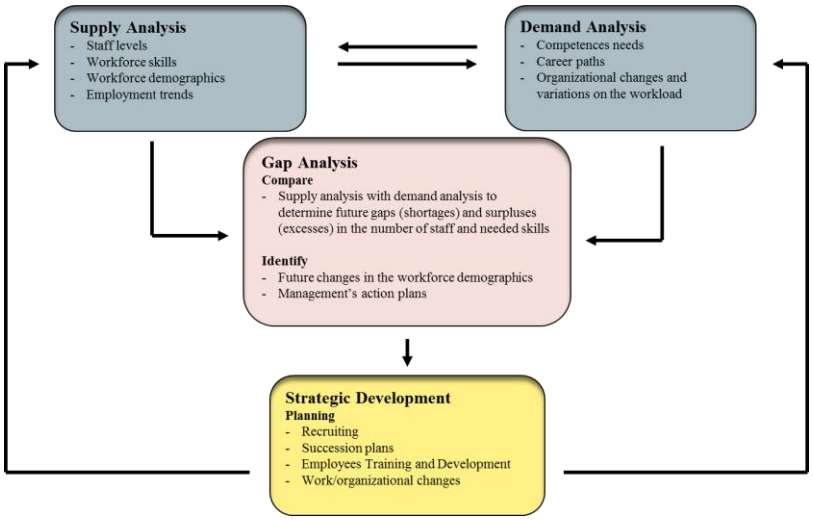


Fig. 1. The human resource planning: scheme

One forecast concerns the supply side, whereas the other the demand of the labor market.

The entire scheme can be read from two points of view: the internal workforce, and the external one. With "internal workforce" we mean the personnel already employed, while "external" are the potential candidates for vacancies. Furthermore, all the elements of the system are strictly interconnected – as we can see from the arrows – and a variation in of one of them may cause a change in the overall setting.

In the supply analysis, staff levels, workforce skills and demographics are taken into consideration. Also the employment trends are accounted for in terms of staff turnover, aimed at predicting future shortage or surpluses.

On the other hand, on the demand side, management's needs are at stake, expressed in terms of skills requirements, development of career paths, and possible variations in the workload.

The two areas are compared with the aim of identifying gaps between what the company already holds, and what is needed. In this way, management's action plans and new requirements in terms of workforce demographics characteristics can be expressed.

The forecasts converge in policies of planning, that invest all the traditional human resource management areas: recruitment, training and development, and succession plans. Further, other than what is already in place inside the company, also future work and organizational changes might contribute at modifying the system of planning (Anderson 2004, Cappelli 2009).

Concerning the instruments that can help the elaboration of human resource plans, one method for predicting both vacancies and job growth is projecting historical trends into the future. In this sense, survey on attitudinal predictors of turnover (e.g. job satisfaction) can give a first snapshot of the number of positions that are likely to become vacant. Above these dimensions, it is important to know which are the general business needs and characteristics of the organization, in order to elaborate plans that can satisfy management's requests in terms of human resources (Schuler 1988).

On the demand for talent, the horizontal time is extended to an intermediate period of two or three years (Jackson & Schuler 1990). During this phase, technical instrument are used in order to establish managers' expectations in terms of production, volume, and sales levels. A common technique are Delphi "meetings", where several experts illustrate their forecast assumptions. Then, these predictions are shared with managers, in order to establish human resource goals and the design of programs aimed at achieving them.

Other two basic methodologies that help supply forecast are judgmental and statistical.

Replacement planning is the judgmental technique in which, using replacement chart, is possible to provide a rough estimate of who will fulfill the potential vacancies (Walker & Armes 1979).

Less common are statistical techniques to forecast supply, which include simple inventory models, Markov analyses, simulations, renewal analyses, and global programming (Dyer 1982, Niehaus 1979, 1980, 1988, Piskor & Dudding 1987). Such models require a knowledge on how employees are likely to flow through the organization, given the past tendencies on the same data. Annual hiring levels, turnover rates, internal mobility, and within-firm transfers are typically considered. These information are the same as the one investigated by internal organizational demographers, and in particular by Pfeffer and his associates (Pfeffer 1983, Pfeffer & O'Reilly 1987, McCain *et al.*1983, Wagner *et al.* 1984), and Konda and Stewman (1980).

Once established both the organizational supply and demand of human resources, gaps may emerge. These can be of two kinds:

> "Gap analysis identifies situations in which the number of personnel or competencies in the current workforce will not meet future needs (demand exceeds supply) and situations in which current workforce personnel or competencies exceed the needs of the future (supply exceeds demand)" (US Department of Health and Human Services: 7)

Gap analysis makes possible to elaborate solutions in terms of recruiting, training, re-training and placement of employees able to fulfill the disparity between demand and supply (Anderson 2004, Bolick & Nestleroth 1988).

Another methodological instruments adopted in the field of human resource planning are simulations, that allow employers to anticipate how talent constraints could impact on business, and eventually how plans can be changed in order to face unexpected events.

Cappelli (2009) analyses a simulation plan where a team of practitioners from the fields of marketing and operations research, modeled outcomes like attrition rates, employee morale, and rates of promotions and outside hires. Other factors considered are facets of the organizational chart, like the span of control, the levels of hierarchy – which affects promotion rates – and "stretch roles" (positions that are reserved for developmental assignments). The aim is to develop models able to align talent management practices with the business goals. A this purpose, through simulations is possible for line managers to verify the options involved, in order to achieve any business plan, and eventually modify them during their implementation.

Cappelli (2009) stresses also the possible errors associated to predictions. Mainly, they concerns problems of undersupply and oversupply estimates, indicated also as "mismatch costs" (Cappelli 2009: 11).

A solution is to look at the forecasts in previous years, and to calculate the average error rate in order to estimate the demand for the year of interest. In the case of not prior forecasts, or of absence of workforce plans against which to work, the author suggests to make an estimation of the standard deviation of the actual demand, and calculate the amount of the variation of the level of business over the past decade.

Finally, Cappelli (2009) suggests that also the costs of being wrong have to be taken into consideration. These can be of different kind: with respect to the job, or to the organization considered. Additionally, the mismatch costs might be different. In particular, for jobs that require specific skills there might be difficulties in fulfilling

vacancies, and then plans aimed to cover the needs of these kind of positions have to be accurately developed. Moreover, an additional element to be taken into account is the choice between internal and external candidates – that is between the option of acquiring from the labor market, or contrary to choose directly from the internal pool through a promotion system. Both solutions have points of strength and drawbacks: if the competencies of internal candidates are well known – representing a "sure" option – the external ones might bring new ideas and a different perspective, but their performance cannot be predicted *at priori* (Solari 2004).

Given these considerations, the amount of hiring needed still remains uncertain, but approximately is possible to calculate it by comparing the adjusted forecast of demand to the number of people that are promoted internally, based on the assessment of mismatch costs. The difference between those estimates represents a good parameter for the amount of outside hiring that a company might have to face (Cappelli 2009).

1.3.3 Empirical cases of human resource planning programs implementation

1.3.3.1 Human resource planning in the public sector

Workforce planning programs have been widely applied in the U.S. public sector in order to respond agency leaders needs to understand how their workplaces will be affected by impeding changes, and consequently, be prepared to handle new challenges (Pynes 2004). Among the major issues raised by the literature, the problem of the so called "baby boomers" replacement emerges as one of the more discussed, in that it has forced governments to seriously reflect on the future workforce shortages.

The public sector areas considered are several: the state (Anderson 2004, Jacobson 2010, Johnson 2004, Lavelle 2007, Pynes 2004), the health care system (Birch *et al.* 2007, Lavieri & Puterman 2009), and public utilities (Krajewsi & Thompson 1975).

Anderson (2004) in his paper *The metrics of workforce planning* makes a review of some of these programs, illustrating the cases of the state of Minnesota, Texas, Virginia, and the commonwealth of Pennsylvania. For each of them he describes which are the variables taken into consideration, and the methodology adopted. Additionally, a special focus is given to the planning metric of the U.S. Army, called WASS+ (Workforce Analysis & Support System), which addresses the problem of retirement.

Going further on the U.S. states analysis, Pynes (2004) elaborates the case of the Washington State Department of Personnel, the state of Nebraska, Iowa, and some others. According to the author, the idea that relies at the base of the planning programs is that human resource management should be vertically integrated with strategic planning, and horizontally with other resource functions. These could be the policies of compensation and benefits, training and development, recruitment and selection, labor relations, and the evaluation of the human resource planning process itself. The final scope is to allow for adjustments to be made in order to compare rapidly changing environmental conditions (Pynes 2004).

Further on U.S. federal states, Jacobson (2010) surveyed 50 North Carolina municipalities, of which 30 participated to the investigation. Still the replacement of baby boomers generations is the major concern.

Despite of the urgency of the issue, only 10 percent of the responded municipalities conduct formal workforce planning, whereas the 30 percent reported to implement informal or department-based planning. A possible explanation of this low level of involvement is the insufficient staffing, the lack of time, resources, and the corporate culture. Similar findings are confirmed by Johnson (2004), who reported results from surveys conducted on International Public Management Association of Human Resources (IPMA-HR) members.

Another sector that has been deeply investigated is the production of health (Birch *et al.* 2007, Lavieri & Puterman 2009).

Birch *et al.* (2007) developed an extended analytical framework based on the production of health-care services that takes into consideration both provider supply and requirements. As supply the authors mean the stock of individuals who are potentially available to provide this kind of services and the flow of activities (e.g. time spent in the production of services). Requirements, on the other hand, depend on four distinct elements: demography, epidemiology, standards of care, and provider productivity.

The framework is applied using a simulation approach to available data for the Atlantic region of Canada, with the aim of showing the impact of different practices over time. The intention was to identify differences in the needs for services within population groups, and changes of them over time.

As baseline for the simulation, current levels of variables (e.g. provider productivity and level of services) are used, and their manipulation allows to consider the effects produced by changes in the policies adopted.

Finally, different scenarios are depicted varying the level of elements such as the size of training programs, the goodness of recruitment and retention policies, the general health status, etc.

Another example of simulation modeling on the Canadian health care system was implemented in the region of British Columbia. Considering the total number of students admitted to educational programs, the total number of nurses to train for management roles, and the total number of nurses and managers to recruit from outside the region to meet forecasted service needs, Lavieri and Puterman (2009) built a simulation using a multi-period finite horizon linear program. The model is based on mathematical expectations on nursing cohorts clustered by age and activity level, covering a period of time of twenty years.

Taking into consideration the local nurse workforce characteristics (e.g. low unemployment rate, skewed age distribution, high female to male ratio, etc.), and the

associated problem of future replacements needs, the authors depict possible scenarios, offering to policy makers a guidance into the identification of policies that should be followed in order to obtain a sustainable workforce.

1.3.3.2 Human resource planning in the private sector

Examples of implementation of human resource planning programs on private companies are few. Chandler and Macleod (2008) in their literature review on workforce planning summarize some cases, but without deepening the analysis. As far as a in deep research on this subject could show, it could be found a single article that deals with these issues in the private sector, and on the European context, is Größler and Zock's study on a large German service provider in the wider field of logistics (2010).

The authors run a system dynamic model to improve the recruiting and training process inside the company they analyzed. According to the authors, system dynamic is:

> "A theory on the structure (and resulting behavior) of social systems, and a method to represent such structures as diagrams and mathematical equations…Today, it is applied to many kinds of systems that change over time, in particular to socioeconomic systems. Practical system dynamics projects comprise three phases: conceptualization/modeling and simulation/scenario analysis" (Größler and Zock 2010: 830)

The company holds a quasi-monopolistic position in the market, and one of its major services is the availability of high skilled operator staff. The training process of workers is very long, and at least equal to 51 months (but it can take even 68 months) – 12 months for the recruitment lead time, 14 months for the basic training, and 24 months for the on-the-job training. It follows that planning is fundamental in order to get the right number of operators trained when is required.

Simulations are developed in two different economic scenarios, one of continuously growing demand for operators, and another with demand cycles around the expected growth trajectory. Findings surprisingly show that in both situations the

number of employees does not grow continuously, but fluctuates around the growth trajectory. According to Größler and Zock (2010), this implies that operator capacity may be characterized by phases of shortage and oversupply.

Simulations allows testing the effects of different delay times and/or hiring policies on the recurring staff availability, demonstrating the potential consequences of changes in policies and the structure of long-term workforce planning. They don't yield a unique solution, but different scenarios according to the intervention line selected by the management.

1.3.4 Human resource planning implementation

Lam and Schaubroeck (1998) in their paper *Integrating HR Planning and Organizational Strategy* develop a study on the application of human resource planning programs within organizations.

Interviewing 85 managers of five different industries, they identify a set of 20 HR planning objectives, grouped in four orientations using factor analysis labeled: 'strategic impact', 'control', 'coordination', and 'communication'. They propose an interpretation to each of them, considering 'strategic impact' as support to the implementation of business strategies; 'control' is aimed to ensure efficient and cost-effective HR functions; 'coordination' refers to the link between various HR functions and the creation of a rational sequence of HR project. Last, the focus on improving employee and top management understanding and support is the role held by 'communication'.

Once depicted the above mentioned HR planning functions, the authors test whether there is a relation between HR planning orientation and the perceived planning performance. Running one-way analysis of variance (ANOVA), they find out that certain HR planning objective orientations are associated with significantly higher levels of perceived usefulness to organizational performance. In particular, the clusters

of ‘coordination’ and ‘control’ are the ones that show the major impact on quality planning performance.

Finally, the authors take into consideration the level of formalization of HR planning programs, discovering that the more formalized, the higher the perception of usefulness attributed to HR planning. Furthermore, if objectives are not clear, HR planning is considered slightly useful, although certain levels of formalization are present.

They conclude suggesting that there is evidence that organizational performance increases following the initiation of formal HR planning programs which links to the organizational strategic objectives. However, until now HR planning has been used mainly as an instrument of convincing top management to allocate sufficient resources for human resource management functions, rather than to enhance organizational performance (Lam and Schaubroeck 1998).

1.3.5 Concluding remarks on the human resource planning

In this chapter we have illustrated what human resource planning implies, its historical evolution, and some empirical cases of implementation of these plans.

A lot of research has been developed around the U.S. public sector, whereas the private enterprise has been neglected by the literature, with the exception of the German case. This is surprising, given the huge problems of succession planning that companies are going to face in the near future. Although planning is not as simple as it was in the past, because of the constantly changing labor market (from both the demand and the supply side), it seems that some plans of action should be taken into consideration if companies don’t want to be unprepared when the ‘baby boomers’ cohorts will go retired.

This is the reason why in this study we chose to analyze a company that is manifesting the urgency of planning its workforce needs for the future. Studying the

past trends of internal and external workers' movements, we will try to develop different scenarios that could characterize its workforce settings.

1.4 Literature review: an integrate approach

In the previous sections we studied in depth three different approaches on the human resource management: the internal labor markets, the organizational demography, and the human resource planning.

We decided to illustrate these streams of research because they allow us to develop an integrated approach to the study of the workforce management of our focal organization, that is the a2a Group.

On one hand, internal labor markets illustrate theories concerning the ways in which people are managed inside the company. As we described in par. 1.1, different can be the variables that might intervene in these processes, both internally and externally from the labor market. In this regards, internal labor markets can be considered the responsible for the organizational dynamics that govern the human resource management, and that can be framed within policies of human resource planning.

On the other hand, once depicted the logics by which people are managed, we can intervene with the aim of modifying or generating new systems able to fulfil the required organizational needs.

The literature on the human resource planning clearly illustrates cases of policy intervention with the purpose of facing critical situations, or unexpected crises.

In the case of the a2a Group, the purpose of the present study is to understand the logics that have historically governed the company's human resource management, and to verify if changes have occurred during the time. In fact, the organization has been involved in huge processes of organizational reshaping that could have played an influence on the ways in which career systems are managed. Furthermore, suggestions in terms of future scenarios will be depicted.

Chapter 2. Data, Research Question and Hypotheses

In the previous chapter we developed a literature review on three interconnected topics: the internal labor markets, the organizational demography, and the human resource planning, because we are interested in analyzing the career paths that have characterized, and still characterize the a2a Group, an Italian multi-services company devoted to the supply of energy, gas, and the waste treatment within the former public utilities sector.

2.1 The Sample

The dataset on the a2a Group workforce represents a unique source of information from several points of view.

First of all, it is an enterprise that employs 11,886 workers placed in a labor market context where the majority of firms are of small or medium dimensions (95 % with less than 10 employees) (www.a2a.eu). Moreover, despite the global economic crisis that affected also the Italian economy starting from 2008, with a reduction of the number of companies equal to -0.2%, the utility sector still records a rise in the number of companies devoted to the supply of energy, gas, water, and air conditioning (+36,8%), and its employees (+1.5%). The same holds for the waste treatment, water supply, and sewerage area, with +2.9% of companies, and +1% of employees (Istat Report 2012). According to this trend, we can analyze the a2a Group workforce dynamics in terms of promotions without a potential bias due to the external negative influence of the economic context.

Another aspect that makes the a2a a good case-study is its historical background, that traces its origins back to 2008 from the merger process of different societies that used to belong in the public sector. Data at our disposal provide information on the

employees starting from 1952 until April 2012 – allowing us to elaborate some comparison between the human resource management of a2a as a public company, and as a private one.

Specifically focusing on the promotion system in place, the a2a Group dataset gives the opportunity to study individual careers from several points of view.

In Chapter 1 we discovered that job movements can be analyzed referring to the concepts of "internal labor markets" and "organizational ecology". Moreover, the human resource planning approach uses a managerial perspective in order to elaborate succession plans aimed at fulfilling vacancies that periodically interest jobs inside organizations. We believe that our study will give a new contribution to this stream of research in different ways. In fact, the merger process, together with the organizational change from public to private company, and finally the number of business areas in which the Group operates inside the Italian market, makes the study on this company absolutely unique and unexplored.

We decided to focus exclusively on the dynamics that interest the management of the human resource promotions, although we are aware that other issues may be considered as relevant approaching this company: the consequences of the privatization on the workforce wellbeing, the ways in which this change has been approached by the management, the influences on the industrial relation systems, and so on. However, we believe that due to the complexity of the case and the multiple dimensions affecting the shaping process of the career paths, is worthy to focus on this issue, given the variety of the perspectives that can be approached.

In the following sections we will illustrate the variables included in our dataset, their elaboration, and the subsamples we built in order to investigate the phenomena under investigation. For this purpose, our research question will be enunciated, as well as the hypothesis formulated in response to it.

Next, Chapter 3 will be dedicated to the "pure" analysis – that is the elaboration of the data in order to verify our research hypotheses.

2.1.1 The variables

The dataset is composed by 84,323 observations on 6,102 individuals. The time span is from November 1952 until April 2012 – almost a 60 years period. Data recorded the events that refer to each single worker, from the date of hiring, until the dismissal. Several information are reported for each individual. From the socio-demographic point of view, gender, date of birth, and educational level are indicated. Additionally, concerning the professional status, we know the date of hiring, the change in jobs characteristics, and also the date of the end of the employment relationship.

In the following section we will illustrate each variable and the categories included inside it.

2.1.1.1 Society

It collects the name of the societies part of the Group. As we mentioned in the beginning of this chapter, the a2a Group originated from the merger process of different societies, that is: Aem (*Azienda Energetica Milanese*), Asm (*Azienda dei Servizi Municipalizzati*), Amsa (*Azienda Milanese Servizi Ambientali*), Ecodeco, and other minor companies of the former Italian public utilities sector, for a total of 70 ones.

For each individual we know the society where he/she works. However, some methodological clarifications have to be made.

In 1999 an Italian legislative decree (the so-called Bersani Decree), established the privatization of the companies that were responsible for the provision of the so-called 'essential services', such the energy and gas supply: this has introduced the change of the a2a organizational status from public to a privately owned society. Afterwards, the Group was officially created in 2008 and formed the configuration it holds today.

Concerning our data, for those individuals that were hired before the privatization process we have a double-society title: the one before and after the merger. For instance, if an individual was hired in 1985 in Aem, and was still employed after 1999, we have firstly used the label "Aem" as society name, and after "a2a". Given that the scope of our research is to study the career paths, and that the merger process implied only an organizational merger, with the single societies still working in the same plants and within the same areas of business, we decided to recode the individuals' society according to the one in which they were originally hired. On the other hand, starting from 2008 this distinction is no longer necessary, and thus all the employees hired from that year on, are considered as all "a2a" employees without exceptions.

The variable "society" is composed by the following categories:

- Aem;
- Asm;
- A2a (starting from 1999);
- Environment;
- Other Energy & Gas;
- Others.

The labels "Environment", "Other Energy & Gas" and "Other" group companies with similar characteristics. Specifically, "Other Energy & Gas" collects all the societies that were not part neither of Aem, nor Asm, but operate in the energy and gas sector. Similarly, the "Environment" gathers all the societies responsible for this specific area of market.

Finally, "Other" includes those a2a Group companies that refer to different areas of business, such as telecommunications, cultural heritage, transportation, etc.

2.1.1.2 Business Area

The business areas are present in each society and are divided into 5 categories.

The largest is “Networks” that is comprised out of the electric and the gas network, the hydric cycle, and other services. It includes the technical-operating administration of the energy and gas distribution, gas transportation, and the integrated hydric cycle management. Moreover, it is responsible for the street lightning, and the traffic regulation plants.

The second category is “Energy”, the production chain devoted to the electricity and gas retail system. It is responsible for the electricity generation and the wholesale markets and trading – on both the national and the international markets.

The third area is the “Environment”. It involves the entire cycle of waste management from its collection, to the treatment, disposal, and recovery of energy through biogas and waste-to-energy plants.

“Heating & Services” is the division of the group responsible for the selling of the heat and energy produced inside the cogeneration plants with the use of the district heating network, and it also includes the management of the heating plants owned by other societies.

Finally, the last area is called “Other Societies & Corporate”. It groups the technical and operational management of the transmission and distribution of electricity, transport and distribution of natural gas, and the management of the integrated water cycle (water collection, management of water, water distribution, and sewerage networks). It also inlcudes the activities related to the public illumination, traffic regulation systems, the management of votive lamps, and systems design services.

2.1.1.3 Job Category

It is comprised out of the classical job categories:

- Blue collar employees;
- White collar employees;
- Executive & Managerial staff.

We decided to include the group Executive and Managerial staff under the same label since they represent a small minority of the dataset.

2.1.1.4 Pay Grade Level

As we have already outlined several times, a2a is a Group of societies. This means that before the merger process, different systems of pay grades were in place inside the companies now part of the Group.

We harmonized these separate systems by referring to a comparison table that allows us to bring each system back to the one adopted today inside the a2a Group.

The pay grade levels are now fourteen, and we divided them according to the main job category of reference. In this way we obtained:

- Blue collar pay grade: from the 14^{th} until the 9^{th};
- White collar pay grade: from the 8^{th} until the 4^{th}
- Executive/Managerial pay grade: from the 4^{th} until the 1^{st}.

We can observe the new configuration from the first column of the table below:

Pay Grade	Energy	Gas-Water	Trade	Garbage	Chemical	Telec.
1	QS	Q	Q	Q	Q1	Q
2	Q				Q2/Q3	
3	ASS	8	1	8	B1	7
4	AS				B2	
5	A1S	7	2	7A	C1	6
6	A1			7B	C2	
7	BSS	6	3	6	D1	5
8	BS	5		5	D2	
9	B1S	4		4	D3	
10	B1	3		3	E1	4
11	B2S	2	4	2A	E2	
12	B2			2B	E3	3
13	CS	1	5	1	E4	
14	C1				E5	

Tab. 2.1. a2a Group: Pay Grade Levels, table of equivalence

We built the pay grade categories trying to take into consideration the jobs collected under each of them, the level of specialization required, and the particular skills that the person has to show in order to be placed inside it.

The blue cells of the table are the ones referring to the “Blue Collar PG”, the red ones to the “White Collar PG”, and finally the green ones to the “Executive PG”. Although there is a higher number of Blue Collar pay grade levels with respect to the other categories, we should specify that we adopted as criteria of classification the analysis of the main jobs that are related to it.

Moreover, in order to be sure of not over-representing one category over the others, we also double checked the percentage of workers that result to be employed in a certain pay grade level within the data on the job category – given the proximity of the two variables.

Taking into consideration the higher number of blue collar jobs, together with the high number of people hired in blue collar positions, we presumed that the higher number of Blue Collar PG with respect to the other categories would not invalidate our estimations.

2.1.1.5 Type of Contract

It is organized according to the area of business, that is: energy, gas, environment, trade, chemical, transportation, engineering, telecommunication, managers.

Also, we created a new variable that takes into account its characteristics, and in particular two categories: standard and non-standard contracts. Standard contract are the full and long-time contracts, while non-standard are all the others.

2.1.1.6 Tenure

It expresses the number of years in which the individual has been employed inside the company.

2.1.1.7 Failure

It is a variable that indicates the number of promotions accorded to a single individual during his/her career inside the company. It takes the values from 1 to 12, where twelve is the maximum number of promotions given to a worker.

2.1.2 The subsamples

Until now we made a description of the variables included in the a2a workforce dataset without distinctions.

However, through our investigation we will take into consideration several subsamples that can give us a satisfying description of the career plans under investigation.

The characteristics of such subsamples are illustrated in the following sections.

2.1.2.1 Society Subsamples

They are aimed at describing separately the career paths within each society.

There are 6 different subsamples according to the society of hiring, describing career paths within each of them according to several relevant criteria.

2.1.2.2 Historical Subsample

Data at our disposal cover an extended period of time – about 60 years. Given that we are interested in studying the human resource management system, we believed that a distinction among years is necessary.

We grouped individuals in 3 categories according to the dates of hiring:

- 1950-1970;
- 1971-1990;
- 1991-2010.

We didn't include in the last group the years from 2011-2012 because we are interested in job movements, and given that people hired in 2011 experienced at least one promotion, their omission does not represent a relevant loss of information.

The criteria on which such division is based are historically grounded. We considered the so called oil-crisis during the 70's as a turning point for the energy industry and the economic collapse. Nineties instead represent years of massive organizational changes for the company: first of all the privatization phase, and after the creation of the a2a Group.

2.1.2.3 1991-2010 Historical Subsample by Society

We also made a further distinction among societies starting from the 1991-2010 dataset. In this way, we can study more in depth the modalities in which the workforce

has been managed in recent years, when the company assumed the characteristics still holds today.

2.1.2.4 1991-2010 Historical Subsample by Pay Grade Level

We created a subsample also adopting as criterion of separation the pay grade level. In fact, with the variable "failure" we know the exact number of promotions that refer to an individual. On the other hand, we also know that the meaning of a job change is different among pay grade levels. For example, it can be that the same number of promotions for one individual concern the passage from an unskilled blue collar position, to a specialized one; conversely, for another worker it may imply a change from a blue to a white collar job level.

We applied the separation among pay grade levels only on the 1991-2010 dataset, because, as we explained earlier, those are the observations that can be considered more representative of the a2a present workforce composition.

2.2 Research Question and Hypotheses

As mentioned previously, in the literature review and in the dataset description the main purpose of this project is studying the career paths of the a2a Group workforce. In particular, the aim of our research is to answer to the following research question:

> *"Which are the determinants that influence the workforce management with respect to the previous findings in the literature on the topic?"*

In Chapter 1 we described in detail theories on the internal labor markets, organizational demography, and human resource planning. The scope of our literature review was to show the main approaches adopted by scholars on the management of the staff flows within companies.

Earlier we mentioned that our case-study, the a2a Group, represents an unexplored field of analysis for several reasons. First of all, it is the first time to our knowledge that an Italian company is studied from this organizational perspective.

Secondly, the history of the a2a Group – a merger process among separate companies, and a privatization policy implementation phase – makes the research even more appealing.

Last but not least, the dataset at our disposal represents a unique sample of analysis, for both the dimensions of the organization, and the period of time taken into consideration.

Approaching the issue, our research hypotheses are explained in the following sections.

2.2.1 First hypothesis

H1: Patterns of career advancement vary according to the different, specific formal organization within the a2a Group.

This hypothesis strictly relies on the internal labor market theory. According to this perspective, there is a set of rules – ascribable in this case to each single society – that shapes the process of promotions. These rules might be permanent – and so there should not be any differences between the pre and post privatization phase, or on the contrary something has changed after the 1990s. However, if this hypothesis is valid, the rules should have created a set of boundaries among firms that might contribute at shaping separate internal labor markets.

2.2.2 Second hypothesis

H2: Patterns of career advancement are affected by the nature of activities, more than by the specific formal organization.

Still, the scenario is compatible with the internal labor markets theory, although the determinant of the boundaries system is the industry of reference. According to this perspective, it is not the fact of being hired in a specific society, but the market that plays a role in the development of the constraints that built the internal labor market. It follows that the system of promotion should show separate trends according to the business area taken into account. In this sense, this hypothesis is closer to Doeringer and Piore's perspective (1971), according to whom internal labor markets are generated by elements such as the skill specificity, on-the-job training, and customary law. Given that the similarity of jobs inside the same area of business implies a certain grade of commonalities among skills and workers' characteristics, we should observe

separate paths of promotions according to the business area, instead of the company of belonging.

2.2.3 Third hypothesis

H3: The change in governance from public to private modified patterns of career advancement in the direction of isomorphism with other private companies.

In this sense, we can conceive the privatization process as a change of the a2a Group's institutional context. According to Bernard and Smith (1991), such modification during the time might produce different internal labor markets.

2.2.4 Fourth hypothesis

H4: The pay grade level (executive, white and blue collar categories), has an influence on the probability within which promotions are accorded. The higher the pay grade, the more rare are the job changes.

In this respect, referring to Konda and Stewman (1980) study on the individual movements within the internal market systems, the authors find out that managerial and vacancies processes should be considered when dealing with models of organizational labor market mobility. They called this approach "opportunity labor demand" as opposed to the two other models tested – that is the "duration markov chain", and the "organizational markov chain". According to the two markovian explanations, job movements are ascribable to constant promotion probabilities for each seniority level (duration markov chain), and stable processes allocated at the organizational level with stationary promotion rates that vary over time in response to the distribution of seniority in the promotion pool (organizational markov chain).

The vacancy and markovian models illustrated by Konda and Stewman give us the chance to develop distinct analyses in order to apply their models on our data. According to them, the determinants of the promotion systems might be individual or organizational, with seniority as additional parameter to be taken into account.

2.2.5 Fifth hypothesis

H5: Promotions are accorded taking into consideration only seniority; the longer the tenure, the higher the number of individual job movements.

The majority of workers employed spend their entire life within the a2a Group: since the hiring date, until retirement – giving us a complete picture of their individual careers. According to Fairris (2004), this might be considered as a strategy adopted by the company in order to retain its workforce, and in particular the less skilled one, taking advantage by the fact that seniority might be related to skill specificity. This consideration is further supported by the length of the job ladders (fourteen in total), usually linked to the individual tenure.

2.3 Concluding remarks on the research question and hypotheses

Approaching the human resource planning literature, we discovered that succession plans have been implemented mainly in the U.S. public sector. To our knowledge, the unique case of private company is the German study of Größler and Zock (2008) – consequently, the a2a Group can be considered a good example of private European utility company in which to develop such kind of plans.

At this purpose, when we dealt with the instances of already implemented HR planning plans, we discovered that a good instrument for elaborating forecasts is to analyze past trends of career paths. In this regards, the answers to our research questions will allow us to get a picture of them, and to depict some considerations that might be the starting point for the future shape of the a2a Group organizational configuration.

In order to test our research question and to check the validity of our hypotheses, in Chapter 3 we will run several analyses aiming at showing the promotion trends that have historically characterized a2a as a Group and the societies part of it. We relate our analyses with the findings of the literature described in Chapter 1, and we will try to elaborate some interesting suggestions in terms of human resource management policies.

Chapter 3. Data Analysis

In Chapter 2 we illustrated the structure of our data, our research question, and the linked research hypotheses.

In the following sections we will describe more in depth the historical background of the Group, because we believe that previous processes affecting the company might have influenced the human resource management in place. Next, we will introduce some descriptive statistics, describing the present workforce composition. Finally, we will run several analyses on the past trends of career paths, and some estimations of the variables that can have an influence on the a2a Group promotion system.

3.1 The a2a group in brief

3.1.1 Historical background

A2a is Italian group that originated in 2008 from the merger process of different Italian public utilities: Aem (*Azienda Energetica Milanese*), Asm (*Azienda dei Servizi Municipalizzati*), Amsa (*Azienda Milanese Servizi Ambientali*), and Ecodeco, plus other minor companies. Today the Group is active in the provision of energy, gas, waste treatment, heating system, and management of the water supply in Italy, France, Spain, the Uk, and Montenegro.

We won't go in depth in the description of the background of all the companies merged in the Group, because this is not the aim of our research. Instead, we will focus specifically only the Aem historical background as an illustrative example of the processes of organizational change at stake. This for several reasons. First of all, Aem is one of the two founding companies of the Group, together with Asm. Further, its history can be considered a good representation of the former public utilities'

trajectories toward the private sector, making it a good example of the processes that interested the other companies now converged in a2a.

Aem allocates its origins at the end of the nineteenth century, when the thermoelectric plant of Santa Redegonda was built in Milan under the management of *Società italiana di elettricità sistema Edison*, responsible for the provision of public illumination and tram service. Taking advantage of the position of monopoly, the company set prices very high compared to the rest of Italy, causing complains among the Milanese population. An initiative for the creation of a public service devoted to the supply of electrical energy followed, and ended in 1903 with the law for the municipalization of public services.

In 1905 the first municipal thermoelectric plant was built in Milan. Two years later, the new city council obtained the administration of a significant hydraulic concession on the Adda river, in Valtellina, and between Bormio and Tirano. The plant provided a long line of transmission (150 km of tension of 65 kv) to the city, crossing the Val Camonica and Val Cavallina. The power station was located near the left bank of the Adda river, in the territory of Grosotto (Lapini 2007). Works were completed in 1910, the same year in which the Aem was officially founded with the name *Azienda Elettrica Municipale* (Local Electric Company).

During the second world war Aem was seriously damaged by the conflict. The situation was fixed only during the 50's, with the building of new hydroelectric plants in Valtellina, that allowed a rising in the company's supply of electric energy – which was doubled compared to the period before the first world war.

During the 80s', following the acquisition of Montedison, at the energy Aem joined also the gas distribution, thus becoming a multi-services society called *Azienda Energetica Municipale.*

A new process of change occurred in 1990 when, in response to the law 142/90, Aem changed its asset in stock company. The name became "Aem S.p.a." and in July 1998 it was quoted in the Milan Stock Exchange, with the 49% of the capital – turning from being a public utility to a private company.

In 1999 the re-organization process, pushed by the Bersani decree on the liberalization of the electric sector, ended up with the creation of a Group composted by operating societies organized through activity sector.

A new activity was added in 2000, when Aem entered in the telecommunication field, providing the city of Milan with an optical fiber network with the aim of integrating the access of voice, internet and video (www.a2a.eu).

In 2001 strategic partnerships with industrial and financial partners were created and strengthened, and new societies as Electrone, Italpower and Plurigas founded. Two years later, consequently to the acquisition of the Enel network and the *Consorzio Edipower*, Aem became the unique electricity distributor in Milan.

Going further on the liberalization process, the municipality of Milan sold a second tranche of the Aem S.p.a.'s corporation stock (17,6%), falling in this way below the 51%. Furthermore, another step was gained in 2005, when in partnership with the French electricity giant EDF (*Electricité de France*) Aem took control of Edison S.p.a., and obtained the 30% of Ecodeco society.

In the October 2007, the shareholders' meeting approved the merger process with Asm, the responsible of the supply of energy in Brescia. The new society changed its name in "a2a". This change was anticipated by the incorporation in Aem of Amsa (*Azienda Milanese Servizi Ambientali*), the responsible of the collection and disposal of public waste in Milan.

3.1.2 The a2a Group Today

Despite the process of privatization that interested the a2a Group during 90's, today the majority of the a2a stocks are owned by public actors. In particular, the controlling shareholders of the a2a Group are the Municipality of Milan and the Municipality of Brescia, respectively with a participation of 27.5%.

The share capital amounts in 2012 to 1,629 million euros. Other than the Milan and Brescia Municipalities, the main shareholders are:

- 39.9% free float;
- 2,5% Carlo Tassara S.p.a.;
- 1,7% Municipality of Bergamo;
- 0,9% a2a S.p.a. (treasury shares);
- 0,7% Municipality of Varese.

They are split into two groups: institutional and retail investors.

Institutional investors represent around 15.2% of the share capital (16.3% in 2011). 46.2% of the free float owned by institutional investors is held by Italian investors, 15.7% by French investors, 13.7% by UK investors. Other relevant countries are USA (9.1%), Germany (6.7%) and Switzerland (2.4%, excluding Alpiq AG, whose shareholding was relevant until September 2012).

The retail investors are approximately 113,000 and own 19.0% percent of the share capital (in 2011 they represented the 17.6%). 99.7% of the retail investors live in Italy and in particular 56.9% of them are in Lombardy, the region where historically the a2a Group has been more active. Investors from the provinces of Milan and Brescia own respectively 25.5% and 12.7% of the total retail shareholding (www.a2a.eu).

The main declared strategic objective concerns a rapid improvement and stabilization of the financial position, through an increase in the operational efficiency and the selective allocation of investments. Moreover, another goal is the organic growth of profitability, with regard to the four core business areas: Energy, Environment, Heat, Networks, including consolidation of the current leadership position.

Beside these strategic plans, to be reached in the short-time period 2013-2015, there are some other declared purposes that involve the medium to long-term, and that leverage on the financial strengthening achieved, and the acceleration of industrial growth with investments focused on the most profitable and environmentally sustainable areas. In particular:

- treatment and waste-to-energy plants;
- cogeneration systems and urban district heating;
- re-powering of generation plants.

The management of human resources becomes more than a crucial issue in order to support the company's present strategic objectives. For this purpose, a look in the past trends of promotions can give us a support on the elaboration of the future HR needs.

3.2 Dataset Description

As was mentioned before, the sample collects information on 6,102 individuals concerning their professional histories within the a2a Group.

The time span considered covers a 60 years period: from 1952 until 2012.

The variables taken into consideration are:

- gender;
- level of education;
- dates of birth, change of the individual professional status, and dismissal;
- society of hiring;
- business area;
- job category;
- type of contract;
- pay grade level.

In the next sections we are going to illustrate some descriptive statistics that can give us a better understanding of the a2a Group structure.

3.2.1 Society and Business Area

As we explained, the a2a Group is composed by different societies that converged in a2a after a process of organizational merger. According to the company in which workers were hired in the first place, we obtain the following distribution:

Society	Freq.	Percent
Aem	1,964	32.19
Asm	1,486	24.35
Environment	579	9.49
a2a	554	9.08
Others	485	7.95
Other Energy & Gas	347	5.69
missing	687	11.26
Total	**6,102**	**100.00**

Tab. 3.1 a2a Group: Societies of Hiring

Table 3.1 shows that the majority of workers are Aem and Asm employees (together about the 56%). The a2a category represents only the 9% because it collects exclusively people hired after the creation of the Group. At this purpose, we should remember that in some cases individuals referred to a new name of the hiring company that changed after the merger process. However, we decided to keep as society of belonging the first one in which the worker was originally hired.

From the point of view of the business area, the company is organized as follow:

Business Area	Freq.	Percent
Networks	4,187	68.62
Other Societies & Corporate	596	9.77
Energy	372	6.10
Environment	203	3.33
Heating & Services	57	0.93
missing	687	11.26
Total	**6,102**	**100.00**

Tab. 3.2 a2a Group: Business Area

Networks represents the main business area (more than 68%), while the others are on average less than 10%. The label "Networks" refers to areas such as the technical-operating administration of the energy and gas distribution, gas transportation, and the integrated hydric cycle management. Moreover, includes those company units for the street lightning, and the traffic regulation plants. This explains why it employs the large majority of the a2a personnel.

"Other Societies & Corporate" is the second largest category with 596 employees (9.77% of the workforce), usually the most skilled ones (especially for what that concerns the Corporate activity). It is followed by "Energy" (6.10%), that involves the electricity generation, and the wholesale markets and trading on both the national and the international markets. "Environment" groups the 3.33% of the total workforce, and it is the area devoted to the waste management. Lastly, "Heating & Service", with 57

employees, is the smaller category, and deals with the selling of the heat and energy produced in the cogeneration plants[1].

3.2.2 Workforce's Socio-Demographic Characteristics

From the socio-demographic point of view, the population is composed almost exclusively by men (4,952 people – 81.15%), and only few women (1,150 people – 18.85%), organized in job categories:

Job Category	Freq.	Percent
Blue Collar	3,168	51.93
White Collar	2,759	45.22
Executive	118	1.93
Manager	56	0.92
Total	6,101	100.00

Tab. 3.3 a2a Group: Job Category

We can note that workers are shared mainly between the categories of Blue and White Collar, that together refers to the 97% of the total workforce. This is not surprising given the business of the a2a Group, mainly devoted to the networks for the supply of energy and gas; Executives instead are only the 2%, whereas Managers the 1%.

We must specify that these percentages refer to the job category in which the workers were hired. In some cases in fact, following the promotions accorded, some people turned their original job category in the next one. In order to reach our goal, we believe that the information on the hiring job category is the most relevant. We will check in the next sections the hypothesis in which an individual changes his/her job category dealing with the survival analyses on the pay grade system.

[1] For a more detailed explanation of the business areas activities, see the variable description in Chapter 2

From a gender perspective, almost all the women (94%) are employed as White Collars, while the 3% as Executives. Male are shared among White (50%) and Blue Collars (45%), and still 3% are Executives and 1% Managers.

In line with the job level representation, the educational level more common is "high school diploma" (46%), followed by the primary school (25%), the "vocational" title (15%), and the university degree (11%). Given that we are dealing with an historical dataset, the high number of people that got only a primary educational certificate is not unusual – above all in a country as Italy where the educational level is on average lower with respect to the other European countries[2].

Eight job contracts over 10 are "standard" – meaning full-time and long term employment relationships. The remaining are fixed-term contracts (15%) and other forms of non-standard jobs.

Finally, concerning the pay grade level, we should remember that we built this variable according to the harmonization of the previous pay grade systems in place when the companies were separated.

In terms of percentages, and considering that the 9% of data are missing, the 51% of people result to be employed inside the Blue Collar PG category, the 25% in the White Collar one, and the 14% in Executive positions. These are indications of the level in which the worker was placed in the hiring time. Considerations on the following paths will be made in the next sections.

[2] Overall, in Italy only the 15% of people have a university degree, with respect to the European average of 28%, and the 31% of the Ocse in the end of 2012

3.3 Career Paths inside the a2a Group

The final purpose of our study is to analyse how historically the workforce has been managed inside the a2a societies now part of the a2a Group, eventually understand if there are differences with respect to some relevant characteristics – i.e. the society, the business area, the job category, the individual tenure, etc. – on how promotions are accorded, and then tracing some scenarios on the future shape of the a2a workforce.

According to what stated in Chapter 2 in the research question and hypotheses section, using some statistical models we will try to verify the validity (or contrary, the falsity) of our statements on the determinants that might influence the a2a Group workforce management.

On this purpose, in the following sections we will dedicate separate analyses aimed at checking each research hypothesis – after had traced a brief remind of the main assumptions linked to each of them. Statistical findings will be commented, and suggestions on the logics that govern the human resource management system traced will be presented.

3.3.1 Testing hypothesis 1 and hypothesis 2.

The impact of the society and the business area on the building process of internal labor markets

3.3.1.1 Method: The survival analysis and the Kaplan Meier survival estimate

The first model adopted is the Kaplan Meier survival estimate, that allows us to make some descriptive statistics on the career paths of the employees' promotion system.

We can imagine workers' job lives as lines in a graph, with a beginning point (the date of hiring), some "dots" on the line (the promotions), and an ending point if the worker has been fired or left the company (date of dismissal). The time span begins with the first hiring, until the last change in the pay grade.

In survival analysis terms, we can translate the changes as "failures" – i.e. events that interest workers' job lives– whereas the time variable (the workers' employment relation) is called "survival time", because it gives the time that an individual has "survived" over some follow-up period: in our dataset a worker survives until he/she experience a job promotion. Given that promotions can be more than one, different failures can be observed for the same employee. The main outputs of a survival analysis are the survival function, denoted by $S(t)$, and the hazard function, denoted by $h(t)$.

The survival function $S(t)$ gives the probability than a person survives longer than some specified time t. In our case, the survival function tells us what is the probability of experiencing a certain number of promotions, taking as reference interval of time the individual tenure inside the company. It follows that survival functions in our dataset range from 0 to 40 (the maximum number of years before an individual can go to retirement). Furthermore, some peculiar characteristics of survival functions are:

- They are non-increasing, that is, they head downward at *t* increases;
- At time *t* = 0, *S(t)* = S(0) = 1, that is, at the start of the study, since no one has gotten the event yet, the probability of surviving past time 0 is 1;
- At time t = ∞, *S(t)* = S(∞) = 0, that is, theoretically, if the study period increased without limit, eventually nobody would survive. So the survival curve falls to zero. In other terms, after a long tenure, most likely all the workers experience the promotion analyzed.

The hazard function instead, denoted by *h(t)*, gives the instantaneous potential per unit time for the event to occur, given that the individual has survived up to the promotion taken into consideration. In contrast to survival function, that focuses on not failing, the hazard function studies the occurring of an event. The relationship between the two curves is the following:

$$S(t) = \exp\left[-\int_0^1 h(u)du\right]$$

$$h(t) = -\left[\frac{dS(T)/dt}{S(t)}\right]$$

The first formula says that *S(t)* equals to the exponential of the negative integral of the hazard function between integration limits of 0 and *t*. The second formula instead describes how the hazard function *h(t)* can be written in terms of a derivative involving the survival function. This formula says that *h(t)* equals minus the derivative of *S(t)* with respect to *t* divided by *S(t)*.

We are not going to explain in detail how the hazard and survival functions are mathematically built, but only how their output can be interpreted for our research purpose (for further information of this topic, see Keinbaum and Klein 2005).

In order to interpret the statistical output, we can both check hazard ratios calculated on all the events that interest an individual, or recurring to a graphical

representation of them through survival curves. These trace for the variable considered as failure (i.e. in our case the number of promotions), a line in a graph where on the x-axis years of tenure are reported, and on the y the probability of the occurrence of the event under investigation. The more skewed is the survival curve, the more luckily the event occurs within a short number of years.

In addition, survival curves can also be estimated by dividing failures according to the category of the variable used as independent. For instance, if we are interested in the impact of the business area on the occurrence of the first promotion, we can obtain separate curves according to the several categories of area of business present in our dataset.

In the next section, we adopt survival analysis techniques to study the first promotion event. Our choice is motivated by the fact that almost all the a2a workers experience the first change in the pay grade system. Obviously, this datum is not significant in order to illustrate a general human resource planning path, in that, as we have just said, the first promotion is accorded to almost everyone. However, this pattern allow us to get a first description of the rapidity within which changes in the pay grade system are accorded.

We take several points of departure for our description. Initially, a simple survival curve of the first promotion is traced for the entire a2a Group. Thereafter, a division by society and business area is depicted. Then, the business areas are studied separately within each society. The final goal is to evaluate if an homogeneous situation or different human resource planning systems are at stake inside the a2a Group.

3.3.1.2 a2a group. First Promotion

In Chapter 2 we stated that, according to the internal labor markets theory, several might be the determinants of job movements within a firm. On one hand, each society may hold its own set of rules that shape the career system (Dunlop 1966) – then we should see different trends according to the company considered. On the other hand, Doeringer & Piore (1971), and Osterman (1984b), suggest that the main influence on promotion trends is the one of skills specificity, and so the criterion of differentiation is no longer the society of hiring, but instead the business area.

At this purpose, we firstly run Kaplan-Meier survival estimates that give us information about the general probability of experiencing at least one promotion during one's individual career.

The Stata output tell us that over a sample of 4,168 employees, 3,701 experience the first promotion. We can see that not all the workers present in our dataset are included in the survival pool (the total of observation is 6,102), probably because not all the people experience a pay-grade movement.

The time interval corresponds to the tenure, and it spans from 0 to 37.67 years (although only a few component of the workforce stays so long inside the company).

We decided to adopt the tenure as temporal parameter because it allows us to elaborate different hypotheses regarding the criteria that may influence the company's logic of promotions.

In Fig. 3.1 we see the graphical representation of the Kaplan-Meier survival estimate for the first individual promotion:

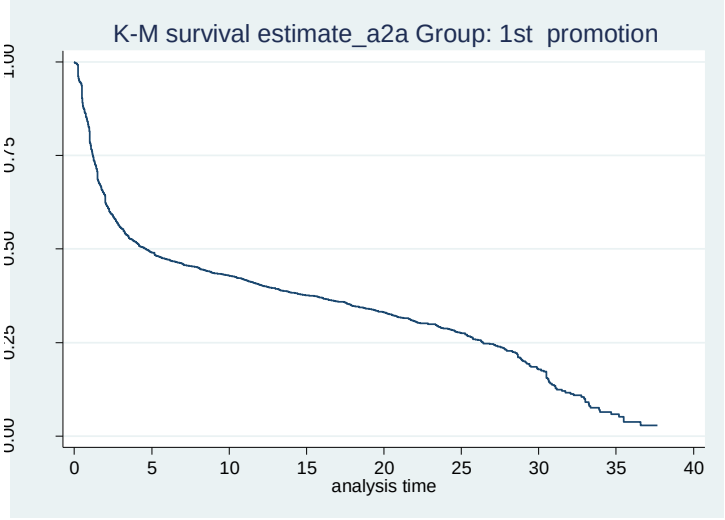


Fig. 3.1 a2a Group. Kaplan-Meier survival estimate: 1st job promotion

The survival estimate curve illustrates that the higher probability of being promoted is registered in the first years inside the company. In particular, the curve is skewed in the period between the first and approximately the third year of tenure – where there is about the 40% of probability of experiencing the first change in the pay grade. During the following time, the curve becomes plane, and this is coherent with the fact that it is unlikely that a person gets the first promotion later on in time. This is confirmed by running the stsum command in Stata, that illustrates how the 25% of probability of being promoted happens after 1.19 years of employment, whereas the 50% of probability after 4.6 years.

Generally speaking, inside the a2a Group job promotions occur on average every 2.13 years, with a standard error of 0.379 and a standard deviation equals to 1.846 years. In other words, since an individual becomes part of the a2a workforce, on average his/her promotion is attained every two years of employment.

The average tenure is 15.65 years, with a standard deviation of 9.79. The high value of the standard deviation indicates that the observations on the tenure are heterogeneous, and the error associated with the mean value ranges between 4 and 34 years of employment. The reason of such variety can be manifold. Checking for the

type of contract with which a2a Group employees are hired, it emerges that almost all of them hold a long-term contracts (the 64.75%), while only the 15.13% is employed in a short-term one (the other data are missing). Then, we can suppose that a short tenure is due to voluntary leaving.

From now, we have only a general image of the a2a Group's human resource management. In the next paragraphs we are going to further investigate this topic, by focusing on several important variables, such as the society of hiring, the business area, and the different historical times.

a2a Group: first promotion. Career paths by society

From the organizational point of view, the a2a Group is composed by 6 main societies, respectively: Aem (32.19%), Asm (24.35%), the group of the Environment (9.49%), a2a (9.08%), Others (7.95%), and Other Energy & Gas (5.69%); the share of workers for which we don't know the society of belonging is equal to the 11.26%.

At this point, we want to evaluate if – according to the single society taken into consideration – different job promotion systems are at place. Running Kaplan-Meier survival estimates, we can see that:

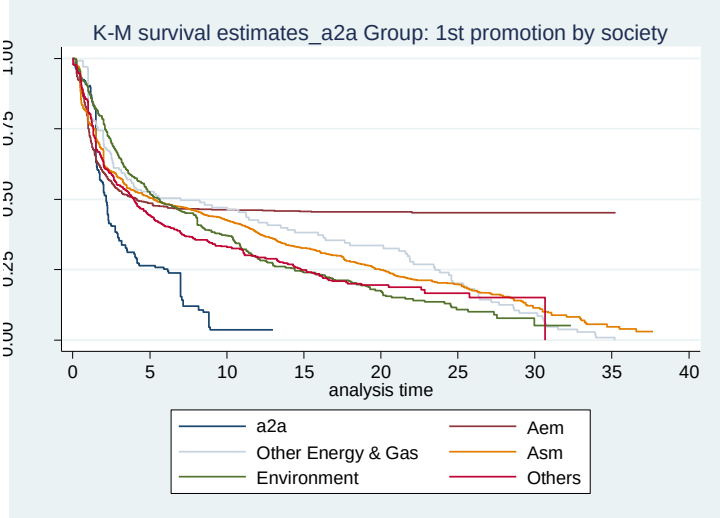


Fig. 3.2 a2a Group. Kaplan-Meier survival estimate: first job promotion by society

The societies of the Group follow similar career paths, with the exception of a2a, that represents a particular case for several reasons. First of all, its sample is restricted because it holds only people hired from the liberalization process started in 1999 – consequently, the longest tenure is shorter and equal to 13 years. Secondly, the Kaplan-Meier curve is more skewed, depicting a faster promotion system compared to the other societies.

Among the others, the societies that seem to show the faster path of promotion are Aem and Other, where people within the first four years of tenure experiment the first elevation of grade with a probability of 50%.

The category in which the change in pay grade occurs later is “Environment”, that lies above the other curves and for which the same probability of 50% happens after 6 years of work.

However, in general, the curves are very close to each other and the trends are similar to the one we traced previously about the Group.

This result suggests a possible difference between the management system in place inside the previously public owned companies and a2a, that is the unique category belonging exclusively to the private market.

Despite the fact that we are dealing with societies that operate in different areas of the market, from the proximity of the survival curves we can assert that an internal labor market is in place as far as the first promotion is concerned. The only exception is "a2a", and this is meaningful given that it is the unique company that does not have a past of public utility.

Contrary to what we stated in hypothesis 1, that a set of rules should create a separate promotion trend according to the society considered, analyzing the first promotion it does not seem that each society adopted its own promotion system. The uniqueness of the a2a slope seems to suggest that it can be the fact of being public or privately owned that makes the difference inside the utility sector, which can be linked to the third research hypothesis [3].

These are only some suggestions that emerge from the observation of the trend on the first change in the pay grade. Further considerations will be made in the next sections, where we will check if the organizational configuration of public or private society, or the business area is the trigger factor that plays a role in the logics of the human resource management practices in place.

Area of Business

After presenting the differences among societies, we now focus on the area of business.

The companies part of our dataset are responsible for the provision of different services. We believe that this characteristic should not be neglected within the investigation of the logics behind the human resource management system. For this reason, we also considered separately each segment of the market. Given that the expertise required by the Energy area is completely different for example from the one of the Environment, our hypothesis it that there could be separate employees' career patterns that may depend on the business area analyzed. According to Doeringer &

[3] **H3:** The transition from public to private company meant also an organizational change toward a different promotion logic, closer to the one of the private market

Piore (1971), and Osterman (1984), the business area can generate skills specificity responsible of the creation of an internal labor market.

We already discovered that the societies follow similar first job movement trends. Here we want to check if survival curves on the business area develop separate paths of promotion.

Applying the Kaplan Meier survival estimate by the area of business, we find the following situation:

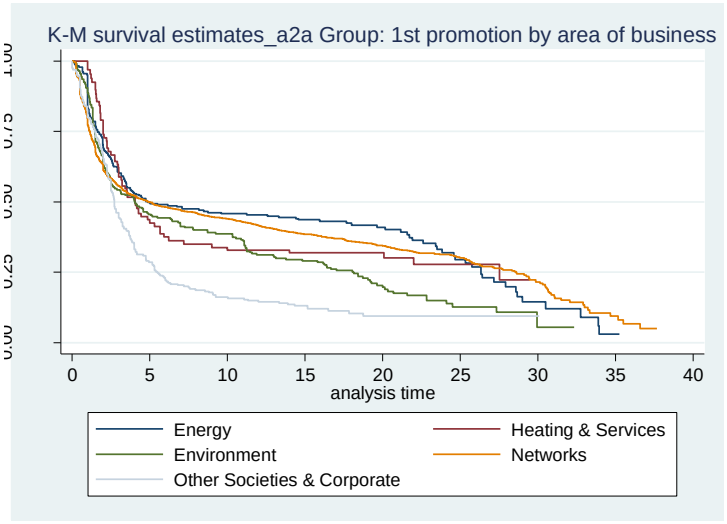


Fig. 3.3 a2a group. Kaplan-Meier survival estimate of first job promotion by business area

As far as the a2a Group is concerned, trends are very close even when the area of business is considered – similarly to what we discovered when we analyzed the trends separately by society. However, we can observe that they are close only within the first five years of tenure, while afterwards the probabilities diverge considerably.

Moreover, the "Other Societies & Corporate" curve is more skewed than the others, distinguishing itself as the business area where promotions happen faster: within five years of employment, the workers have the probability equal to 75% of being promoted.

The reason of this trend can be traced back in the job categories:

Job Category	Business Area						Total
	Energy	Heating & Services	Environment	Networks	Other Soc & Corporate	*missing*	
Manager	0	0	0	1	0	0	**1**
	0.00	0.00	0.00	100.00	0.00	0.00	**100.00**
Executive	3	1	3	51	5	1	**64**
	4.69	1.56	4.69	79.69	7.81	1.56	**100.00**
White Collar	128	33	42	1,234	169	39	**1,645**
	7.78	2.01	2.55	75.02	10.27	2.37	**100.00**
Blue Collar	25	21	136	1,644	47	41	**1,914**
	1.31	1.10	7.11	85.89	2.46	2.14	**100.00**
Total	**156**	**55**	**221**	**2,930**	**181**	**81**	**3,624**
	4.30	**1.52**	**6.10**	**80.85**	**4.99**	**2.24**	**100.00**

Tab. 3.4 a2a Group. Job category by business area. Absolute and relative frequencies

In table 3.4 we considered exclusively the sample of people that got at least one promotion: in fact the total is no longer 6,102, but 3,624.

Network and Other Soc. & Corporate categories employ the largest share of workers – respectively the 79.69% and 7.81% – over the entire job category "Executive". The same consideration still holds even for the White Collar category, although inside the Network area Blue Collars are numerous as well.

Considering the level of education – that can give us a picture of the workforce human capital – and relating it to the business areas, we obtain the following representation:

Educational Level	Business Area						Total
	Energy	Heating & Services	Environ	Networks	Other Soc & Corporate	*missing*	
University Degree	34	12	9	315	25	2	**397**
	0.94	0.33	0.25	8.69	0.69	0.06	**10.95**
High School Diploma	96	29	57	1,626	145	26	**1,979**
	2.65	0.80	1.57	44.87	4.00	0.72	**54.61**
Others & Vocational	14	6	21	328	18	9	**396**
	0.39	0.17	0.58	9.05	0.50	0.25	**10.93**
Primary School	11	8	94	661	33	44	**851**
	0.30	0.22	2.59	18.24	0.91	1.21	**23.48**
missing	1	0	0	0	0	0	**1**
	0.03	0.00	0.00	0.00	0.00	0.00	**0.03**
Total	**156**	**55**	**181**	**2,930**	**221**	**81**	**3.624**
	4.30	**1.52**	**4.99**	**80.85**	**6.10**	**2.24**	**100.00**

Tab. 3.5 a2a Group. Educational level by business area. Absolute and relative frequencies

One more time, we observe that the upper levels of education are recorded in the Network and Other Society & Corporate categories, with a percentage of employees that attended a university course equal to the 8.69% for the Network, and people with a diploma equal to 44.87% for Network and 4.00% for Other Society & Corporate. This is can be obviously related with the above table of job category, in that usually the higher the level of education, the best is the allocation inside the organizational chart.

Educational Level	Job Category				Total
	Blue Collar	White Collar	Executive	Manager	
Primary School	712	138	1	0	**851**
	37.20	8.39	1.56	0.00	**23.48**
	19.65	3.81	0.03	0.00	**23.48**
Others & Vocational	288	107	1	0	**396**
	15.05	6.50	1.56	0.00	**10.93**
	7.95	2.95	0.03	0.00	**10.93**
High School Diploma	901	1,047	31	0	**1,979**
	47.07	63.65	48.44	0.00	**54.61**
	24.86	28.89	0.86	0.00	**54.61**
University Degree	13	352	31	1	**397**
	0.68	21.40	48.44	100.00	**10.95**
	0.36	9.71	0.86	0.03	**10.95**
missing	0	1	0	0	**1**
	0.00	0.06	0.00	0.00	**0.03**
	0.00	0.03	0.00	0.00	**0.03**
Total	**1,914**	**1,645**	**64**	**1**	**3,624**
	100.00	**100.00**	**100.00**	**100.00**	**100.00**
	52.81	**45.39**	**1.77**	**0.03**	**10.95**

Tab. 3.6 a2a Group. Educational level by job category. Absolute andrelative frequencies

Our considerations on the link between the educational level and the job category are confirmed in Tab 3.6, where we reported the absolute values, the percentages of column, and the overall percentages of the educational level crossed by job category. We can notice that the school title more frequent is the high school diploma (54%), followed by the primary school (23%), university degree (11%), and other and vocational (11%).

Considering each job category separately, and its percentages of column, we can observe that the majority of white collar (63%), and executives (48%) hold a diploma; at the same time, a university degree is the educational level for the 48% of executives, 21% of white collars, and for the unique manager. We should also outline the fact that the 47% of blue collars is in the high school level, indicating that among the blue collar professions there are skilled professional jobs.

Overall, observing the promotion trends by business area, and the descriptive statistics on the job category and educational level, we can state that hypothesis 2 is partially grounded. Although in the first years of tenure the first job movement is experienced for all the workers within the same range of time, after the fourth year the situation changes and paths are separated, especially as far as the "Other Societies & Corporate" curve is concerned. Checking for the workforce composition in terms of job category and educational level, we found that probably these paths can be explained in terms of differences among workers from the competences and skills held.

According to Doeringer & Piore (1971) and Osterman (1984b), people belonging to different business areas manifest skills specificity that is at the origins of the creation of separate internal labor markets. It is not the fact of being hired in a certain society part of the Group, but working on a certain job that makes the difference in career trajectories along the years of tenure.

Still, these considerations hold for the failure variable we considered, that is the first change in the pay grade level. In order to confirm our findings, in the following sections we will develop analyses that concern the job movements separately by business area, but estimated within each society considered as separate sample.

Business areas within societies

Until now we described the first promotion distinguishing firstly by society, and then by area of business. Given the fact that our final purpose is to delineate the ways in which the Group has historically managed its employees, we believe that a specific analysis of each society separately might be helpful.

This allows us to understand the individuals' career paths, and then, the future Group's need in terms of human resources inside the single companies.

Firstly, we illustrate some descriptive statistics on each society, in order to understand the composition of our subsamples:

a2a	Freq.	Percent
Networks	118	69.41
Heating & Services	27	15.88
Energy	20	11.76
Environment	5	2.94
Total	170	100.00

aem	Freq.	Percent
Networks	1,285	92.05
Other Societies & Corporate	62	4.44
Energy	35	2.51
Heating & Services	14	1.00
Total	1,396	100.00

asm	Freq.	Percent
Networks	1,108	95.85
Environment	19	1.64
Energy	11	0.95
Heating & Services	9	0.78
Other Societies & Corporate	9	0.78
Total	1,156	100.00

Environment	Freq.	Percent
Networks	261	71.31
Environment	100	27.32
Heating & Services	5	1.37
Total	366	100.00

Other Energy & Gas	Freq.	Percent
Energy	79	62.70
Networks	44	34.92
Other Societies & Corporate	2	1.59
Environment	1	0.79
Total	126	100.00

Other societies	Freq.	Percent
Other Societies & Corporate	148	44.98
Networks	114	34.65
Environment	56	17.02
Energy	11	3.34
Total	329	100.00

Tab. 3.7 a2a societies. Area of business. Absolute and relative frequencies.

The size of the samples is varies, in that the majority of people is hired in Aem (1,396) and Asm (1,156), while other societies present a number of workers that ranges between 366 and 126. This is due to both an historical explanation, and a methodological reason. From the historical point of view, Aem and Asm are the first two companies that merged founding the a2a Group. Amsa, Ecodeco, etc. became part

of a2a only in a second time. This implies that our dataset – that reports data on workers from November 1952 – holds a larger number of observations for the first two companies.

Moreover, from a methodological perspective, we decided to classify workers who reported two companies of belonging (respectively before and after the creation of the a2a Group), by referring them to the first society where they were originally hired. For example, if an individual reports as society of hiring "Asm", and in 2003 the company changes becoming "a2a", we arbitrary recoded it as "Asm" for all the worker's job tenure. We are aware that this is an arbitrary decision, but given that our final purpose is to understand how people are managed inside the a2a Group, and that Group's plants and organizational charts remained still the same after the liberalization process, we believe that it is meaningful to study individuals' history from the perspective of the continuity, and not "truncating" observations only for a formal change in the Group denomination. Stated this methodological explanation, we can understand why the "a2a" category reports such a strict number of observations (170 employees): in fact, those are the workers that have been hired directly inside the Group, without a previous story in one of the other societies.

Lastly, we want to remember that we decided to classify separately "Other Energy & Gas" from "Other" societies because they group completely different companies. Despite both of them employ only a small minority of the total workforce, we believe that it would have been theoretically wrong to gather them under the same category of society.

We already discovered that career paths are similar among societies, but different if the business area is considered. These supplementary estimates will allow us to understand if this diversity can be referred to the trends that specifically concern some societies, or if they follow their own paths without distinctions. If we were wrong when we stated that it is not the society of hiring, but the business area that shapes internal

labor markets, we should obtain curves that are close to each other within the society considered.

Conversely, if the second hypothesis is true – that is skill specificity declined in terms of business area is responsible for the promotion systems in place – we should estimate curves that are separated within each society, but similar if compared among business areas belonging from different companies.

In this respect, we have to outline fact that internal labor markets might be created also by "institutionalized" rules, such as trade unions agreements (Bernard and Smith 1991). Unfortunately, we do not have at our disposal information on the rate of employees' unionization rate. However, according to the Italian regulation of labor contracts, all workers are indiscriminately subjected to the collective agreements established at the national level by the major trade union organizations. Usually, these agreements are applied according to the industry of reference.

In the case of the a2a Group, we have 9 different contracts, illustrated in the following table by area of business.

	Type of contract							
Business Area	**Gas**	**Environment**	**Trade**	**Manager**	**Electrical**	**Others**	**missing**	**Total**
Networks	182	258	4	1	2,45	30	5	**2,93**
	6.21	8.81	0.14	0.03	83.62	1.02	0.17	**100.00**
	5.02	7.12	0.11	0.03	67.60	0.83	0.14	**80.85**
Energy	26	0	26	1	99	2	2	**156**
	16.67	0.00	16.67	0.64	63.46	1.28	1.28	**100.00**
	0.72	0.00	0.72	0.03	2.73	0.06	0.06	**4.30**
Environment	0	166	6	0	8	1	0	**181**
	0.00	91.71	3.31	0.00	4.42	0.55	0.00	**100.00**
	0.00	4.58	0.17	0.00	0.22	0.03	0.00	**4.99**
Other Societies & Corporate	30	27	106	0	53	3	2	**221**
	13.57	12.22	47.96	0.00	23.98	1.36	0.90	**100.00**
	0.83	0.75	2.92	0.00	1.46	0.08	0.06	**6.10**
Heating & Services	22	0	22	0	11	0	0	**55**
	40.00	0.00	40.00	0.00	20.00	0.00	0.00	**100.00**
	0.61	0.00	0.61	0.00	0.30	0.00	0.00	**1.52**
missing	0	9	0	0	46	26	0	**81**
	0.00	11.11	0.00	0.00	56.79	32.10	0.00	**100.00**
	0.00	0.25	0.00	0.00	1.27	0.72	0.00	**2.24**
Total	**260**	**460**	**164**	**2**	**2,667**	**62**	**9**	**3,624**
	7.17	**12.69**	**4.53**	**0.06**	**73.59**	**1.71**	**0.25**	**100.00**
	7.17	**12.69**	**4.53**	**0.06**	**73.59**	**1.71**	**0.25**	**100.00**

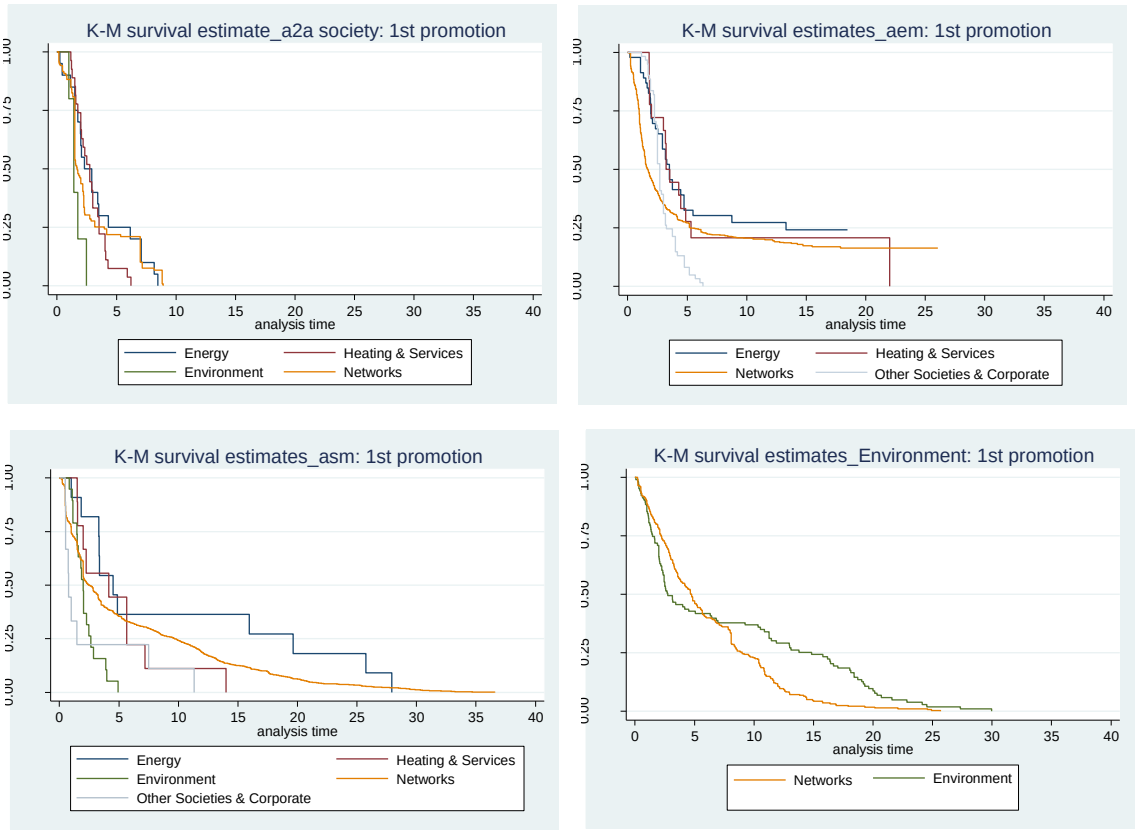
Tab. 3.8 a2a Group. Type of contract by Business area: Absolute, relative and column frequencies

We grouped under the "Others" category the chemical, mechanist, telecommunication and transportation contracts, because their percentages considered singularly were very low – in fact overall they employ only the 1.71% of people that got the first promotion.

From the table it clearly emerges that the type of contract more spread is "Electrical", with a percentage equal to 73.6%. We also calculated the percentages of row, because in this way we can check the contracts distribution along the business areas. It emerges that not only "Electrical" is overall the more frequent, but also within the areas of business it collects respectively the 83% in "Networks" and the 63% in "Energy". The contracts on the environmental area are obviously a lot in the "Environment" (91%), while "Trade" is prevailing in the "Other Societies & Corporate" category.

Coming back to our analyses, from the picture that emerges from Tab. 3.8, we should not have problems concerning the influence of the type of contract on the promotion system, given that the vast majority of them are grouped under the category "Electrical" (73%), followed by "Environment" (12%), "Gas" (7%), and "Trade" (4%). The 73% of the electrical category assures us a sort of homogeneous situation within which we should not expect divergent trends that can be motivated by a different contractual setting.

At this point, we can go further on the analysis of the business areas. The graphs of Fig. 3.4 report Kaplan Meier estimates for the first promotion considered separately inside each society:



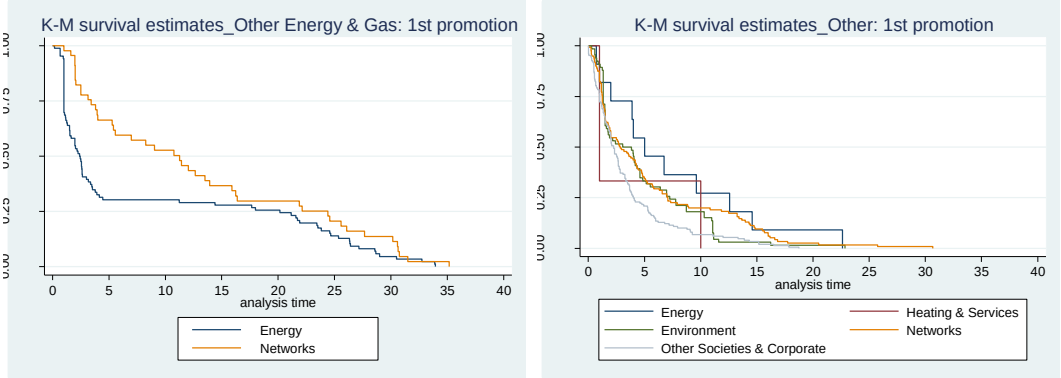


Fig. 3.4 a2a societies. Kaplan-Meier survival analysis estimated separately for each society by business area

Before commenting the survival analysis findings, we should point out that in some cases the comparison among areas of business is not possible, because of the absence of one category (for example the Environment societies have only the Network and Environment business areas).

Hypothesis 1 is still neglected, in that we can observe that within each society there are clear differences among the business areas. If contrary patterns of career advancement had been characterized by logics internally managed by each single formal organization, we should have expected promotion trends similar in terms of business areas within each single society, but comparatively different among organizations.

Concerning hypothesis 2, we can make some general considerations, and afterwards depict some evaluations.

The “Energy” area holds a similar shape in “a2a” and “Aem”, and “Other Energy & Gas”, in that the first change in the pay grade is accorded mainly within the first five years of employment. However, a consideration should be made concerning the “Other Energy & Gas” society, where after an initial period of time in which promotions occur frequently, it follows a distribution of the first job changes along the years.

In order to explain these findings, we looked in detail at the data, discovering that they concern the oldest observations on people hired during the decade 1971-1980 characterized by only one promotion after more than twelve years of work, within long tenures of thirty years. Probably this is due to a lack of information in the workforce dataset. Nevertheless, the ssample size is small, and then we have reason to believe that it won't invalidate the results of our study.

Differently, in "Asm" and "Other", promotions happen with discontinuity as far as the "Energy" curve is concerned, but we can ascribe this finding to the small dimension of this category (11 people in each society – opposite to the average of 44 of the other societies).

The Environment area is present in a2a, Asem, Other, and Enviroment societies. The shape of the curve is very skewed in Asm, and the probability of being promoted for the first time is verified for all the workers within the first five years. In the Environment societies – that we conceive as the most relevant for the trend of this sector – we can see that after an earlier period of time where the probability is very high, the curve becomes plan and the trend is decreasing from the fifth until the twentieth year of employment. The sample is composed by 100 employees – it is not very large – but we can still assert that the career system in this area is slower than the others analyzed. This consideration still holds when we take into account the same area in "Other" societies – where a first period of fast promotions is followed by a slowing pattern of change in the pay grade system. However, the societies in which the number of employees is higher in this area – that is the "Environment" societies (100 people) and "Other" (56) – show similar trends in job movements, further confirming our hypothesis on the existence of an internal labor market based on skill specificity.

On "Heating & Service", we can see from the frequencies of Tab. 3.8 that it employs a small minority of the organizational population, ranging from 9 to 27 employees. Interestingly, the higher number of workers in this business area is reported

inside the younger society, “a2a”, suggesting that the Group started to invest on this market in recent years.

Where present, the “Heating & Service” curve is closed to the “Energy” one, with the exception of Asm, where promotions occur sooner.

Other Society & Corporate instead, represents the area where the most skilled workers are hired. This is confirmed by the fact that in all the societies its trend is almost vertical – suggesting that all the workers manifest a high probability of being promoted very soon during their career.

Last but not least, the Networks category is the largest of our sample. The vast majority of the a2a Group workforce has been hired in this area. This means that its trend is very relevant in order to make some consideration on the overall human resource planning system. From the graphs of Fig 3.4 we can note that, except for a2a, inside all the societies the first change in the pay grade is accorded with a slow decreasing trend.

Taking as a comparative parameter the 50% of probability of experiencing the first promotion, we can see that this event is experimented within 5 years of tenure. As anticipated, the only exception is “Other Energy & Gas” society, and also the “Environment”, that slightly postpones the first job movement.

On this regard, we can say that the Environment societies in general seem to postpone the promotions for both the categories of business area included in their sample. A possible reason may be that they hire people less skilled than the others. At this purpose, data on educational level confirm our hypothesis – in that inside the Environment societies the 42% of people hold a primary school certificate of education.

Coming back on the comparison among the “Networks”, we can declare that there is a common path of promotion among societies– although with some deviations from the main trend.

At the end of our review on the first promotion pattern considered by business area and society, we can conclude that, generally speaking, the first promotion is accorded within the first five years of employment.

We run survival estimates on the business areas considered separately within each society because we wanted to check if the supposed validity of our second research hypothesis would have found a further empirical support, other than the one we got during the evaluation of the first change on the overall Group business areas.

Findings demonstrate that such kind of support exists, and it is confirmed by the comparison among survival curves on all the societies. Furthermore, we outlined a specificity of the "a2a" promotion paths, in that curves delineate faster promotion trends. This brings us to our third research hypothesis, for which the transition from the public toward the private sector might have changed the human resource management system in place.

Hence, in the following part of our study we will divide the observations on the a2a Group workforce according to employees' time of hiring. In particular, the periods taken into consideration are the decades 1950-1970, 1971-1990, and 1991-2010. We decided this specific segmentation of time because we cannot neglect that the economic context changed during these years, as well as the a2a Group organizational setting.

For this reason, after a description of the dataset composition for each span of time, we are going to make some comparison aimed at testing if something happened, or contrary, if the fact that now the a2a Group is a private company didn't affect the system of promotions.

3.3.2 Testing hypothesis 3.

The impact of the transition from public to private company on the building process of internal labor markets

In this section we will focus on the diversities that characterize, or contrary, do not characterize the historical phases of the a2a Group in terms of human resource management. In particular, according to the third hypothesis of our research, our goal is to verify if the transition to the private market has changed the promotion system inside the Group, and in case it did, which are the new criteria according to which job movements occur today.

In order to analyze this issue, we will firstly describe the workforce composition of the clusters of time we built. Secondly, for each period we will show the promotion trends by society and business area. Lastly, a comparison between the pre and the post privatization phase will be depicted, according to both the hiring date and the business area.

3.3.2.1 The first promotion on an historical perspective

Data at our disposal concern people that were/are part of the a2a Group workforce from 1952 until 2012. We decided to group them according to the date of hiring in classes of twenty years each.

This is their distribution by groups of two decades:

Year of Hiring	Freq.	Percent	Cum.
1950-1970	391	6.40	6.40
1971-1990	2,474	40.54	46.94
2001-2010	3,059	50.14	97.08
missing	178	2.92	100.0
Total	**6,102**	**100.00**	

Tab. 3.9 a2a Group. Year of hiring

The first category collects people hired during the decades 1950-1970s, for a total of 391 workers. Overall, they represent only a small minority of the dataset (the 6.40%), and in general information on them are quite poor, reporting only the date of hiring and dismissal, whereas few are the indications on job movements. This makes the sample not very reliable, but we still believe that it is meaningful to keep apart these data from the ones of people hired in the following twenty years. Our decision is grounded on a theoretical consideration, in that during the 70s the oil crisis happened, and we believe that this event could have influenced the promotion system in place. About that, the category 1971-1990 holds more detailed information and also the dimension of the sample is larger (the 40% of the total subjects).

Finally, the label 2001-2010 summarizes the years of massive organizational changes: the liberalization process of the public utilities sector following the Bersani's decree in 1999, and the creation of the "a2a Group" consequent to the merger process of different societies. These seriously affected the company, that from public became

private owned (although the Milanese and Bresciana municipalities still remain the main stakeholders).

In this last subsample we did not consider people hired in 2011 and 2012, because a tenure of two years is not significant from the point of view of job promotions.

Hiring date 1950-1970

The first range of time considered is 1950-70s. Unfortunately, data are not complete, and we have observations only on 325 employees. Moreover, job promotions are recorded only for 45 of them. As we anticipated, during these twenty years, information is mainly about the hiring dates and the dismissal ones.

The average tenure is more than 33 years, with a minimum value of 25.8 and a maximum of 39.6 years. The lack of information concerns in particular the decade 1950-1960s where over the 94 people hired, only for ten of them a promotion is recorded.

Afterwards we will consider exclusively data on employees that during those years experienced a job movement, given that our final purpose is to understand the logics that lie behind the human resource planning system. Then, our sample is restricted to only to45 workers.

The societies involved are exclusively "Aem" with 30 individuals, and "Asm" with only 1, while the remaining data is missing.

Job categories are divided as follows:

Job Category	Freq.	Percent	Cum.
Executive	5	11.11	100.00
White Collar	24	53.33	53.33
Blue Collar	16	35.56	88.89
Total	**45**	**100.00**	

Tab. 3.10 Historical Dataset 1950-1970. Job categories

From Tab. 3.10 it emerges than half of the workforce hired between 1950 and 1970 holds a white collar position, the 35.56% are Blue collars, and 4 people are Executives. All of them are males and only one – the Aem employee – experienced 12 promotions, while all the others got promoted two times. Consequently, it does not make sense to run a survival analysis by separating the number of failures (i.e. promotions), but it is reasonable to use the entire dataset in order to get an overall image of the promotion system.

Plotting survival estimates on a graph, we obtain the following imagine:

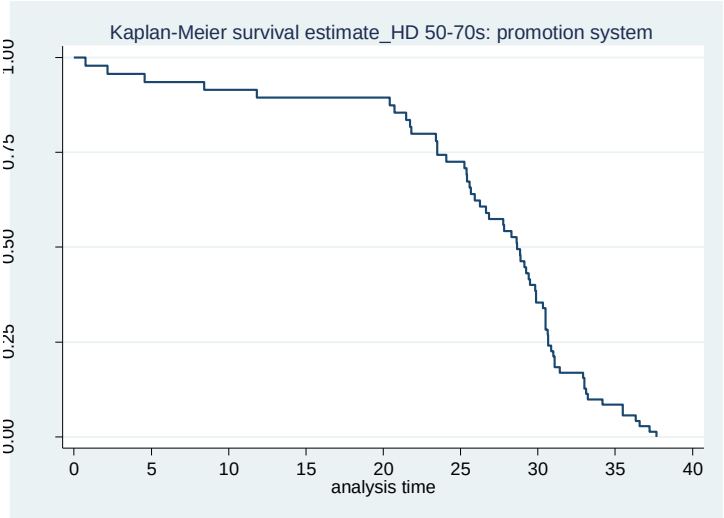


Fig. 3.5 Historical Dataset 1950-1970: promotion system

The pattern is peculiar in that for people hired between 1950 and 1970, it seems that promotions happen more likely after 20 years of employment, except for few events that are recorded in the first twenty years. As stated earlier, there is a lack of information concerning these individuals, in that only few events are reported concerning their job careers. It follows that we can ascribe this unexpected shape of the survival curve to the poverty of the events reported on these workers.

However, despite these limitations, we believe that this subsample can still give us useful indications on the impact that the socio-demographic variables that can play on the promotion system, which will be a topic discussed in section 3.3.3.

Hiring date 1971-1990

The following twenty years show a completely different situation with respect to the previous data. In fact, societies show a similar composition with respect to the a2a group, with the exception of the "a2a" category, given that the Group was founded in 2008.

Employees hired between 1971 and 1990 are organized by society and job category as follows:

	Job Category			
Society	**Executive**	**White Col**	**Blue Coll**	**Total**
Aem	3	221	465	**689**
	0.44	32.08	67.49	**100.00**
Other Energy & Gas	2	24	16	**42**
	4.76	57.14	38.10	**100.00**
Asm	6	266	196	**468**
	1.28	56.84	41.88	**100.00**
Environment	1	58	104	**163**
	0.61	35.58	63.80	**100.00**
Others	1	62	21	**84**
	1.19	73.81	25.00	**100.00**
missing	1	6	22	29
	3.45	20.69	75.86	100.00
Total	**14**	**637**	**824**	**1,475**
	0.95	**43.19**	**55.86**	**100.00**

Tab. 3.11 Historical Dataset 1971-1990. Individuals by societies and job category. Absolute and relative frequencies

Over 1,475 employees, almost half of them are employed in Aem, the thirty percent in Asm, and other categories collect the remaining 19.59% (1.97% are missing). Compared to the past twenty years, the dataset is richer for what that concerns the Aem workforce, providing an image of the a2a Group composition more similar to the present one.

Blue collars and White collars are almost equally represented (43% vs 55%), although the percentage of Blue collars is higher in Aem and Environment, where they are more than the 30%. Overall, Tab. 3.11 shows that the societies are mainly devoted to technical jobs, while the Executive profiles are a small minority.

The distribution by gender is disproportionate to the benefit of men (the 84%), and the same is true for the business area, where the Networks employs the 93% of the workforce.

Contrary to the subsample of employees hired form 1950 to 1970s, in which the number of job promotions was equal to a maximum of two changes (except 1 case), during 70-90s this number increases reaching for one individual the number of twelve. Concerning the first job movement, we obtain the following graphical representation:

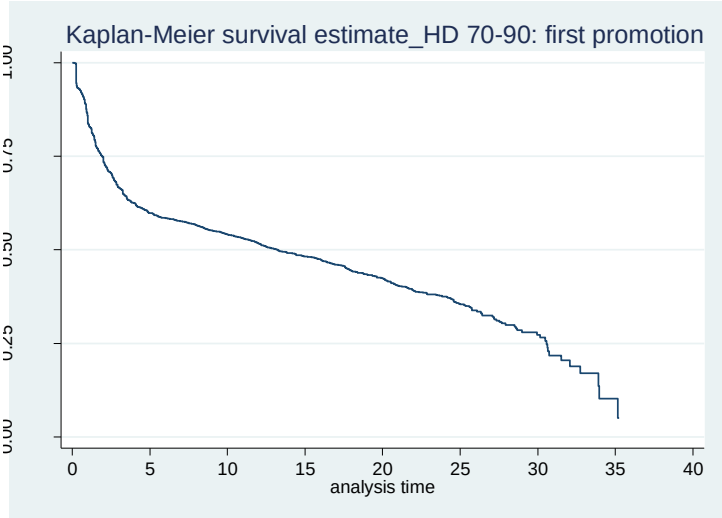


Fig. 3.6 Historical Dataset 1971-1990. Group: 1st change of pay grade

As for the general trend illustrated for the a2a group, for the period 1971-1990 we can note as the first change of pay grade is accorded mainly during the first five years of employment, with a probability of 40% in correspondence of the fifth year of tenure, and it is slowly decreasing afterwards.

The longest tenure is 35 year, confirming that inside the a2a Group a lot of people remain for all their job lives.

Given that for those hired between 1971 and 1990 the company's composition in terms of society is closer to the present one, a focus on the distribution of the first

promotions according to them might be informative of the logics of human resource management adopted.

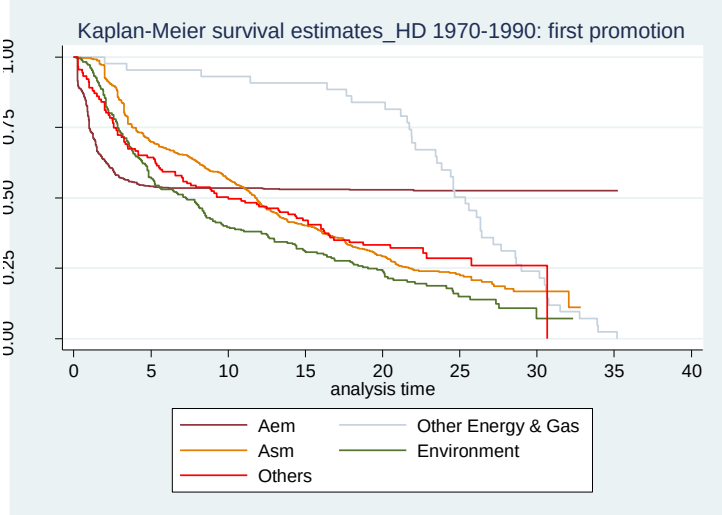


Fig. 3.7, Historical Dataset 1971-1990. a2a Group: 1 change of pay grade by society

We cannot make a comparison with the period 1950-1970, given that for that time we don't have a robust sample. However, the considerations on these years will be useful in order to develop a comparison with the next decades 1991-2010.

At a first glance, it emerges a common path among societies, where curves are parallel in Fig. 3.7, although job movements are postponed for some years. Taking as a reference point the 50% probability of being promoted for the first time, we can see that the first society that experiences the event is Aem after 5 years (although its curve is slightly up the 0.50), followed by Environment after 7 years, and Others after 11. Asm employees' failure occurs in correspondence of 12 years of tenure, while data on Other Energy & Gas shows that the first change in the pay grade is situated at 25 years of tenure.

Analyzing in detail each curve, Aem is the society where the first promotion happens sooner. In fact, by the fourth year of employment, there is a probability of 40% of experiencing the first job promotion.

Despite the fact that Asm holds similar characteristics and employs the second larger share of the Group workforce, the first change in the pay grade is postponed with respect to Aem, and the same probability occurs after 7 years.

Environment and Others are located in the middle with respect to Aem and Asm, and their trend is strongly decreasing, ending after thirty years of tenure.

Finally, the Other Energy & Gas trend is peculiar. In fact, the curve describes a situation where the first promotion, except for some cases on the left-side of the graph, occur after a tenure of seventeen years. In order to verify the validity of the data, we checked each individual hired in this society (for a total of 42), and we discovered that all these people experience only a job change, and this happens mainly from 2008 onwards. The specific year, together with the uniqueness of the promotion, makes us to believe that probably the company recorded as "change in pay grade" the merger process towards the a2a Group. Then, observations on the "Other Energy & Gas" employees report only the date of hiring, the first change conceived as the creation of the a2a Group, and eventually the date of the dismissal. Following these consideration, we cannot rely on the Kaplan Meier curve of Fig. 3.7 as indicative of a promotion pattern inside these societies.

From a general perspective, we can assert that the logics of promotion are similar among societies, although there is a gap in the temporal distribution of the first job movement. This further confirms what we stated on the first hypothesis, when we neglected the possibility that is the society of reference that creates its own internal labor market.

Concerning hypothesis 2, we consider the business area of interest. However, almost all the workers are part of the Networks (91.25%), and so it is not possible to get some conclusions on the impact of business areas on career paths. However, this category has a shape similar to the one of Aem reported in Fig. 3.7, due to the fact that the 46% of the people hired in the Network area are also Aem's employees. Then, the

shape of the Network simply replies the one of the Aem workforce, and for this reason we decided to not report the related graph.

We want to remember that this period of time – 1971-1990 – has been characterized by a serious economic crisis consequent to the oil shock in 1973. The general context may have influenced the ways in which a2a Group employees were managed. In particular, if the system of promotions was based on rewards, rather that automatic changes in the pay grades, we would observe in the next period a growth in the number of first promotions assigned to workers. In fact, a better economic situation could play a positive influence on the management of job movements; moreover, it has to be remembered that in 1990s the public utilities sector was privatized. This may further accelerate the time within which promotions are assigned.

Generally speaking, the promotion system in place for people hired between 1971-1990 is characterized by slow career paths – given that the first job movement happened after several years of tenure. A possible reason of such trend might be due to the intrinsic characteristics of the public services labor market, which traditionally was "protected" in contrast to the more competitive private one. In this context, promotions might be accorded exclusively because of seniority eligibility, whereas in the private market they can be adopted as an instrument of retention for better performing workers.

Hiring date 1991-2010

During the twenty years from 1991 to 2010 the company – after a liberalization process – became privately owned, and the a2a Group was definitively created. For this reason the label "a2a" now appears among the categories of society, representing those people that were directly hired inside the a2a Group.

Society	Freq.	Percent	Cum.
Aem	704	33.73	33.73
Asm	655	31.38	65.12
Others	243	11.64	76.76
Environment	203	9.73	86.49
a2a	170	8.39	94.87
Other Energy & Gas	85	4.07	98.95
missing	22	1.05	100.00
Total	2,087	100.00	

Tab. 3.12 Historical Dataset 1991-2010. Individuals by societies

Once more, the largest number of workers is employed in Aem (33.73%), followed by Asm (31.38%), whereas the other societies record an average share of employees equal to the ten percent.

Compared to the Group composition in 1971-1990, the percentage of workers divided by society remains almost the same, with the exception of Aem, that previously employed the 46% of the Group workforce, and now the 33%. Probably, this loss in Aem went to the advantage of a2a that in fact collects the 8% of the employees.

From a gender perspective, males represent the vast majority (76.76%), while women are only the 23.24% and in large part devoted to white collar jobs (21% over the total). Men are mainly Blue collars workers (50%), and for the 25% White collar ones. In table 3.13 we can see the percentage of women and men for each job category:

Job Category	Gender		
	F	M	Total
Executive	17	31	48
	0.81	1.49	2.30
White Collar	448	524	972
	21.47	25.11	46.57
Blue Collar	20	1,047	1,067
	0.96	50.17	51.13
Total	**485**	**1,602**	**2,087**
	23.24	**76.76**	**100.00**

Tab. 3.13 Historical Dataset 1991-2010. Individuals by job category and gender

The area of business is, as for the other decades, disproportionate to the benefit of the Networks, although the percentage of employee is smaller (equal to the 75.30%) compared to the previous years. The second larger category is "Other societies & Corporate", and this is coherent with the fact that during 1991-2010s the percentage of Executives raised from the 0.90% of 1971-1990s, to the 1.49%. The Environment area groups the 7.41% of them, followed by the Energy at 6.15%, and Heating & Services at 2.66%.

The average tenure is 10.6 years, with a standard deviation of 5.29 years. This can be related to a different workforce approach toward the company, in line with the Italian labor force general trend. In fact, while during the past people employed in the a2a societies more likely stayed within the same workplace for their entire job history, now data on tenure describe a different situation. This cannot be motivated by a change in the type of contract, given that only the 3% of the a2a workforce has been hired with fixed-term contracts. Probably, we are dealing with a general different workers' attitude toward work, with a preference in experiencing more than one workplace during their career.

Dealing with the first promotion, and running survival analysis we see that the first change in the pay grade interests the 97.39% of the workforce, almost all the

employees. The longest tenure is equal to 20.55 years, much shorter with respect to the 1971-1990s, where it was equal to 37.

Plotting the estimate on a graph, we obtain the following curve:

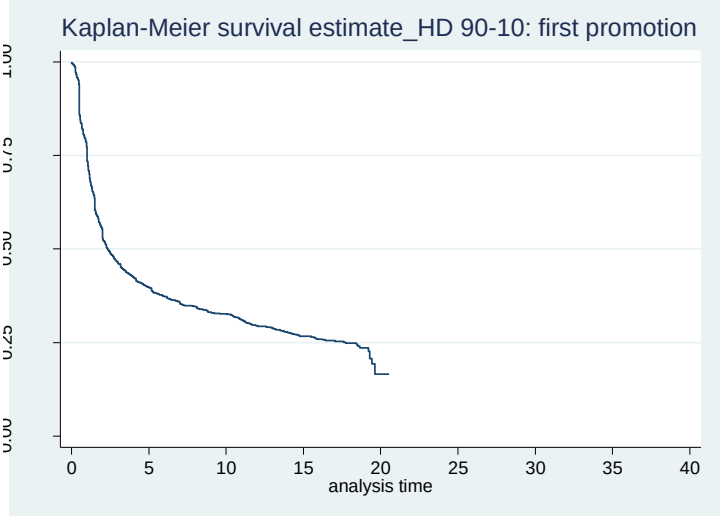


Fig. 3.8 Historical Dataset 1991-2010. a2a Group: 1st change of pay grade

If we compare it with the one depicted on the 1971-1990 cluster (Fig. 3.6), it is evident that the first promotion pattern has changed during this period. Here, almost all the employees experience the first promotion within five years of tenure. The curve is very skewed, indicating that the probability of failure is high in the first time, and equal to 50% within 2.3 years of employment. In the 1971-1990 subsample instead, the curve slope changes its shape sooner, and the probabilities of being promoted were spread during the time, and equal to 50% within 13th year of employment.

The implications in terms of human resource management systems are massive, if we take into consideration the fact that during these last twenty years the company became privately owned: survival estimates seem to show that the organization now promotes people sooner with respect to the past, and this happens despite the fact that employees' tenure is shorter.

From this point of view, it is interesting to verify if we are dealing with a general trend, or if this pattern is different considering the societies and the areas of business. Observing the societies, we obtain the following survival curves:

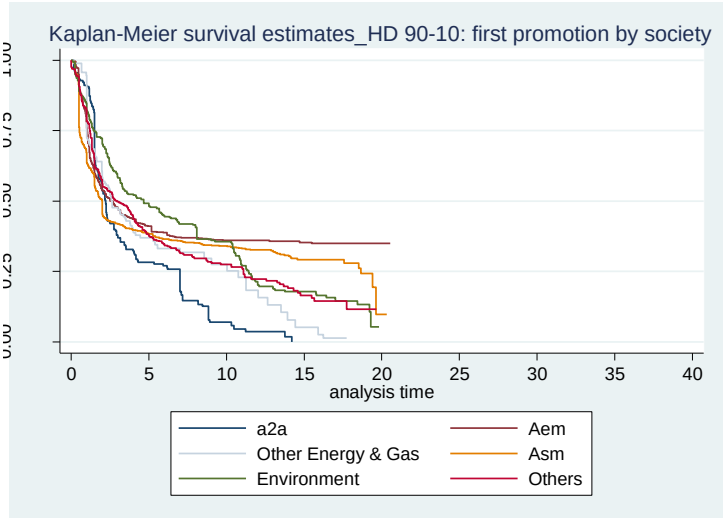


Fig. 3.9 Historical Dataset 1991-2010. Group: 1 change of pay grade by society

that is, each society now grants the first promotion sooner with respect to the past.

We can see that the probability of being promoted for the first time is equal to the 50% for all the societies in a range of time between 2.5 and 4 years of tenure. The only exception are the “Environment” societies, that postpone the same probability at the fifth year of employment.

During the decades 1971-1990 instead, the society with a skewed trend in the first promotion was Aem, whereas for the other ones the probability of 50% of getting a promotion was experienced between the seventh and twelfth year of employment.

Further, if we consider that the most skewed curve in the above graph, the one concerning the a2a workers – that is those people employed more recently, and in particular after the creation of the a2a Group – we can make some considerations on the fact that the change of the organizational configuration in a private company seems to have influenced the ways in which employees are managed. In particular, since the

creation of the a2a Group as a private society, the individual careers are faster with respect to the past, when the separate societies were public utilities.

Considering the business area, the situation is the following:

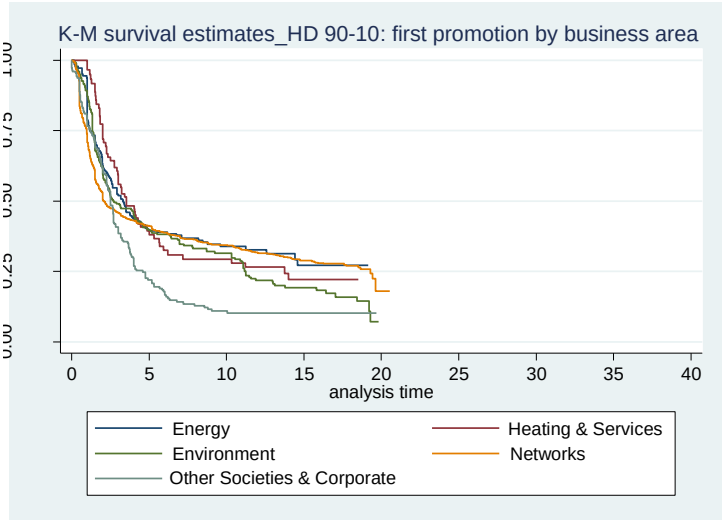


Fig. 3.10 Historical Dataset 1991-2010. Group: 1 change of pay grade by business area

The trend is similar to the one concerning the societies, with a more skewed curve that interests the "Other Societies & Corporate". Given that this is the second largest category in the business area (8.45% people hired in it *vs* 75% of Networks), we developed some assumptions on the possible causes of the shape of its curve on the first promotion.

First of all, we thought that "Other Societies & Corporate" may hold a large number of workers employed in a2a, the society where the first promotion is accorded faster. Cross tabulating the variable "society" and "business area" such correspondence does not emerge: in fact, the majority of people whose jobs are in the Other Societies & Corporate area are employed in "Others" and "Aem", whereas "a2a" does not have observations in this specific branch of business.

Checking for the job level, and assuming that "Other Societies & Corporate" may show an higher number of workers in Executive positions, we found that our

hypothesis was still incorrect, in that the majority of people holds a White collar position.

Finally, we also controlled for the educational level, to see if it was higher than for the others. Once more time, we did not confirm our assumptions, in that the majority of "Other societies & Corporate" employees hold a high school diploma.

We cannot justify the "peculiar" shape of the "Other Societies & Corporate" first promotion pattern by relating it to the society of origin, the job category, or the educational level. The lack of connections among these variables suggests that the reason of this faster promotion pattern might be traced back to a different logic of promotion of human resource management in this specific area, potentially linked to the employees' performance.

What we discovered observing the subsample on the people hired between 1991 and 2010 completely changes the scenario we depicted on the internal labor market logics at the origins of the promotion systems. Whereas for both the overall sample of the a2a workforce, and for the cluster of people hired between 1950-1990s the responsible of a certain job movement trend seemed to be the area of business, the situation completely changes as far as the last twenty years are concerned. Here, societies show separate promotion trends, and conversely this does not hold for the business area, where curves are closed to each other (even though with the exception of Other Societies & Corporate).

Despite the past, now we can accept hypothesis 1 and refuse hypothesis 2: it is the fact of being part of a specific society to make the first promotion more luckily to happen, and not the business area (with the exception of the "Other Societies & Corporate"). However, we remember that we illustrated a third possible cause of the career management system in place – that is the influence of the private market (where the company operates now), in the contrary to the previous public status, and in this regard it seems that the transition to the free competition has played a role on the job careers management.

In order to further investigate the issue, we are going to analyze separately each society and to study the promotion paths by business area comparing the pre and the post-privatization phases, in order to understand if this trend involves all the business area indistinctly, or if instead there are differences among them.

3.3.2.2 The pre and post privatization phase: comparison among societies and business areas

Until now we described career paths initially taking into consideration all the societies and the areas of business, and next dividing the dataset in periods of time. From the above analyses differences between the pre and post privatization phases emerged: Kaplan Meier survival estimates show that since the Group became privately owned, workers are managed differently from the past, and promotions seem to occur sooner.

As when we were evaluating the Group as a whole, we will focus on each society separately, and the area of business inside it; we also make comparisons between the pre and the post privatization phases, in order to evaluate if the human resource planning system has changed as a whole, or if only some societies or some areas of business adapted their logics to the one of the Group.

Here, we reported the Kaplan Meier survival estimates by business area for each society and for the two different periods of time considered (1971-1990s and 1991-2010s). In the tables absolute and relative frequencies indicate the number of workers employed in each category.

Aem

The first society taken into consideration is Aem, one of the largest societies part of the Group and on which we have a lot of information both from the past, and the present workforce.

Here, graphs on the survival estimates concerning the first promotion are reported:

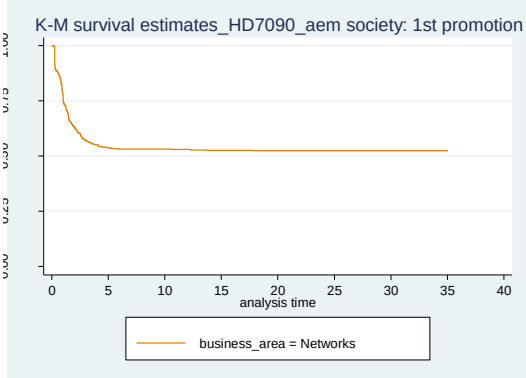


Fig. 3.11 Aem. Historical Dataset 1971-1990. Kaplan-Meier survival estimates by business area

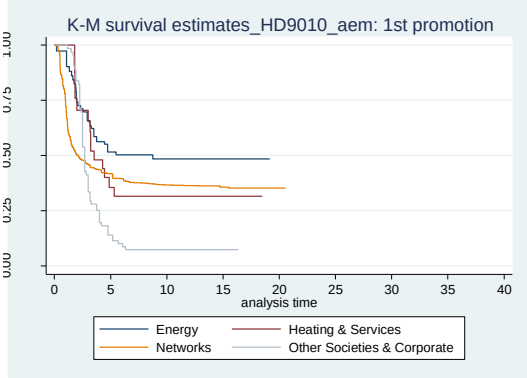


Fig. 3.12 Aem. Historical Dataset 1991-2010 Meier survival estimates by business area

	1971-1990		1991-2010	
aem	**Freq.**	**Percent**	**Freq.**	**Percent**
Networks	687	99.71	597	84.56
Other Societies & Corporate	.	.	62	8.78
Heating & Services	1	0.15	13	1.84
Energy	1	0.15	34	4.82
Total	**689**	**100.00**	**706**	**100.00**

Tab. 3.14 Aem. Business areas: Absolute and relative frequencies

Comparing the curves for the years 1971-1990s with the following period 1991-2010s, we can see that the organizational structure has completely changed during the time. While in the past the unique area of business was Networks (with only two exceptions), today Aem is divided in different areas – even though the Networks still remains the prevalent. This fact makes us to believe that the organization of the a2a Group as private company has also meant a new strategic approach towards the market, and consequently a different human resource management system. This clearly

emerges from the company number of people employed inside the Corporate, Heating & Services, and Energy business areas – that increased during these years.

Observing the survival estimates curves of the Networks, we can note that the pattern is similar on the two graphs. The probability of being promoted is equal to the 30% after 2 years, although in 1971-1990 the curve becomes plane after the fourth year of employment; in 1991-2010 instead, people still get the first promotion even after five years.

The other areas of business in 1991-2010 are composed by less individual and show a different pattern for the first promotion, that happens later in time – around the fourth year of employment – and ends close to the sixth year of tenure. The more skewed curve is for Corporate & Other Societies, where all the people experience the first change in the pay grade sooner and in a stricter range of time (4-6 years).

Asm

The situation in Asm is illustrated in the graphs:

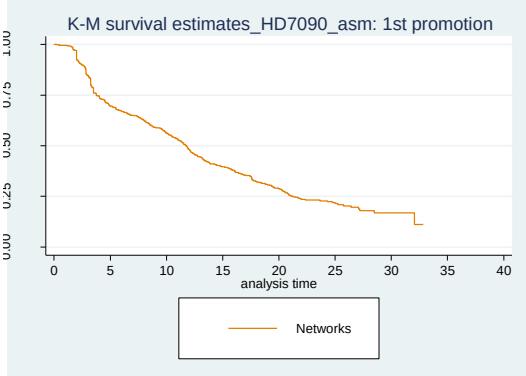


Fig. 3.13 Asm. Historical Dataset 1971-1990. Kaplan-Meier survival estimates by business area

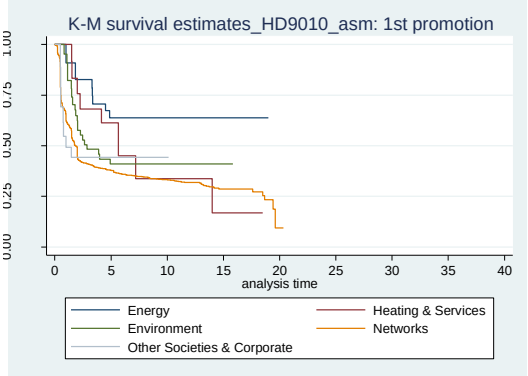


Fig. 3.14 Asm. Historical Dataset 1991-2010. Kaplan-Meier survival estimates by business area

	1971-1990		1991-2010	
asm	**Freq.**	**Percent**	**Freq.**	**Percent**
Networks	462	98.72	613	93.59
Other Societies & Corporate	2	0.43	7	1.07
Heating & Services	.	.	9	1.37
Energy	4	0.85	7	1.07
Environment	.	.	19	2.90
Total	**468**	**100.00**	**655**	**100.00**

Tab. 3.15 Asm. Business areas: Absolute and relative frequencies

As for Aem, in the past Asm employed people exclusively in the Network area, with only few exceptions in Other Societies & Corporate and Energy. In 1991-2010s instead, also the Environment and Heating & Services are present.

The Kaplan Meier survival estimates curves show that the trend for the first promotion for people hired during 1971-1990 was peculiar, in they experience the event with a decreasing probability during the time – equal to 25% after 5 years of employment, 50% after 12 years, and 75% after 21. The shape of the curve changes as far as the dataset of people hired between 1991-2010 is concerned. Here, the curve is more similar to the general first promotion trend, with the highest percentage of events concentrated within the first five years of tenure (around the 60% probability of being promoted), even though the majority of people get the first change in the pay grade sooner, and in particular by the third year of employment.

We analyzed in detail the observations about the sample of people hired between 1971 and 1990 in order to understand the reasons behind the peculiar shape of the Kaplan-Meier curves. It emerged that the first promotion is accorded to almost all the people starting from the ‘90s. Given that these are data about the employees hired between 1971 and 1990, this means that the first promotion for those hired in 1971 happened after almost twenty years of employment and descending. Then, the shape of the curve can be explained by positioning on the left side those hired in the end of the ‘80s, for whom the first promotion follows a traditional trend – i.e. is accorded between the second and the fifth year of tenure – and on the right part the individuals hired during the ‘70s. The reason of the tardive promotion system can be due to both a lack in the information held in the dataset, or to a different human resource management system of Asm when it was a public company.

Moreover, in general we can say that since the creation of the a2a Group as a private company, Asm has changed its human resource management system in place, that became closer to the one of the overall Group. In particular, promotions still occur sooner in the “Network” and “Other Societies & Corporate” areas (50% of probability within 3 years), and are slightly postponed for the “Environment”. “Energy” and “Heating & Services” do not show a linear trend, but we should point out that they employ only a small minority of the Asm workforce.

Overall, as far as Asm employees are concerned, with respect to Aem it emerges a more homogeneous situation in terms of promotions by business areas, with the “Network”, “Other Societies & Corporate” and “Environment” curves nearer to each other.

Environment societies

When we analyzed the first promotions by focusing on the type of society, we discovered that the Environment group in 1991-2010 was the one where the shape of the Kaplan-Meier curve was less skewed. By comparing it with data about the people hired in 1971-1990, we can understand if this fact characterizes recent years, or if instead the situation was different in the past.

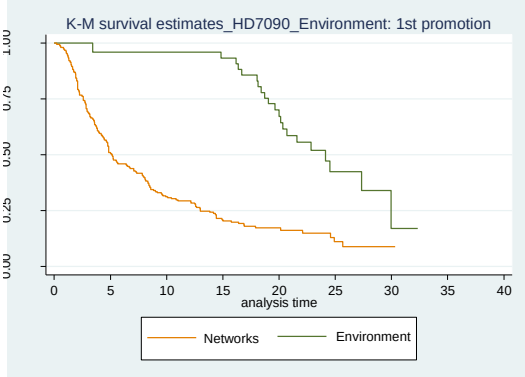


Fig. 3.15 Environment. Historical Dataset 1971-1990. Kaplan-Meier Meier survival estimates by business area

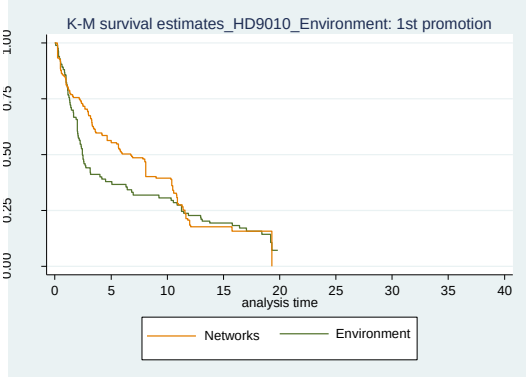


Fig. 3.16 Environment. Historical Dataset 1991-2010. Kaplan-Meier Meier survival estimates by business area

	1971-1990		1991-2010	
Environment	**Freq.**	**Percent**	**Freq.**	**Percent**
Networks	138	85.71	123	60.00
Other Societies & Corporate	.	.		
Heating & Services	2	1.24	3	1.46
Energy	.	.		
Environment	21	13.04	79	38.54
Total	**161**	**100.00**	**205**	**100.00**

Tab. 3.16 Environment societies. Business areas: Absolute and relative frequencies

By definition, the Environment societies manage only two areas of business, that is the Environment and Networks. Both samples of people hired between 1971-1990 and 1991-2010 are quite small, composed respectively by 161 and 205 employees, and the main area of business is “Networks”, where the 85% and 60% of people work.

During the 1971-1990s for the area “Environment” we observe a possible gap of information concerning the first promotion, in that it seems that they are accorded after fifteen years. We already discussed this kind of finding in the paragraph on the Asm

employees. The small number of observations makes the results even less reliable, given that the curve describes the promotion pattern of a sample composed only by 21 individuals. The Networks curve instead, for the same period of time is close to the trend we have seen until now, with the fifty percent probability of experiencing the first promotion within five years of tenure, followed by descending probabilities in the next years.

The situation completely changes as far as years from 1991 until 2010 are concerned, where the Environment business area curve is more skewed than the Networks one. At the same time, the share of people employed in the Environment area increases, reaching almost the forty percent. This confirms our assumptions on the organizational change due to the founding of the a2a Group, characterized by a different human resource management planning system from both the business area and first promotion point of view.

Other Energy & Gas

The Other Energy & Gas label groups all the societies devoted to the supply and distribution of energy and gas that do not belong from Aem and Asm, but are part of the a2a Group. They are a small minority compared with the other societies, and they hired only 42 people in 1971-1990, and 84 in 1991-2010 (see Tab. 3.17)

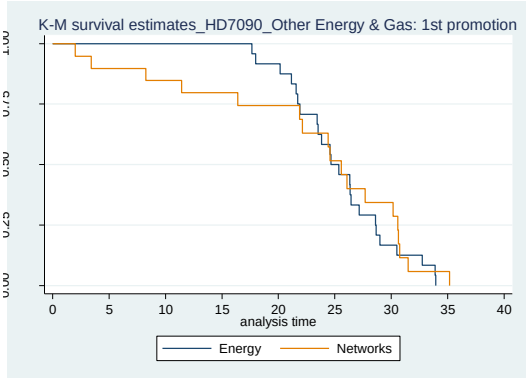


Fig. 3.17 Other Energy & Gas. Historical Dataset 1971-1990. Kaplan- Meier survival estimates by business area

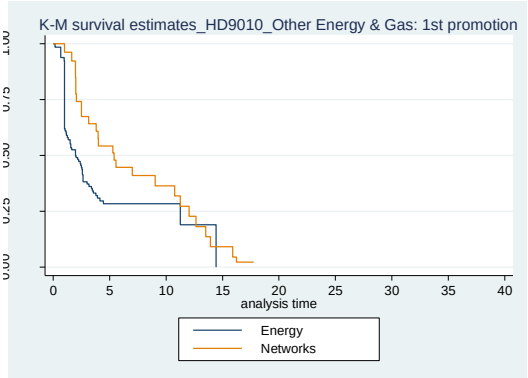


Fig. 3.18 Other Energy & Gas. Historical Dataset 1991-2010. Kaplan- Meier survival estimates by business area

	1971-1990		1991-2010	
Other Energy & Gas	**Freq.**	**Percent**	**Freq.**	**Percent**
Networks	18	42.86	26	30.95
Other Societies & Corporate	.	.	2	2.38
Heating & Services	.	.	.	.
Energy	24	57.14	55	65.48
Environment	.	.	1	1.19
Total	**42**	**100.00**	**84**	**100.00**

Tab. 3.17 Other Energy & Gas societies. Business areas: Absolute and relative frequencies

The same situation we have just seen in the Environment societies is present in the "Other Energy & Gas" data on people hired between 1971-1990. From the Kaplan-Meier survival curves, it emerges that, with a few exceptions, workers experience the first change in the pay grade after a tenure of twenty years, and problems of low availability hypothesized on the Environment findings still hold for this subsample.

Interestingly, the estimates for the workers of the Energy area in the sample 1991-2010, show a faster path of promotion, with almost all the first changes in the pay

grade experienced in the first five years of employment. We shall remember that this area is devoted to the wholesale markets and trading, and then it is possible that it employs more skilled workers. At this purpose, checking for the job and the educational level, it emerges that the 65% of people in the Energy area is hired in a white collar position, and the 20% hold a university degree, whereas the 63% a high school diploma. Assumption on the fast career path due to the workers' employability is then confirmed.

Others

"Others" is the label that represents all the societies part of the a2a Group that do not operate in the gas and energy field.

As Tab. 3.18 shows, the sample is small, and composed only by 84 individuals hired between 1971-1990, and 245 in 1991-2010. It is a high specialized branch of the company, and in fact, it is the unique in which the category "Other Societies & Corporate" employs the majority of people (respectively the 50 and 43 percent). It follows that the job category more represented is, for both the periods of time, "White collar", that reaches the percentage of 73% in 1991-2010.

From the point of view of the first promotion, given the characteristics of its workforce, we should expect very high skewed curves, above all for the "Other societies & Corporate" area – even though results can be biased by both the small size of the sample, and by its heterogeneous composition.

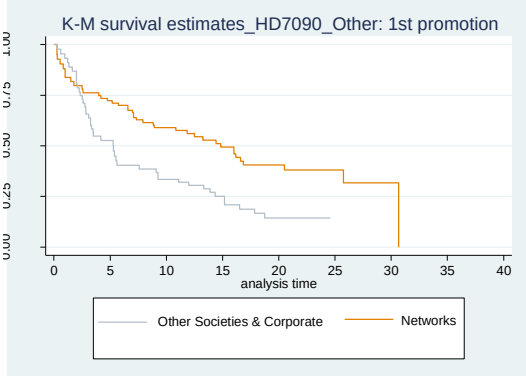


Fig. 3.19 Other. Historical Dataset 1971-1990. Meier survival estimates by business area

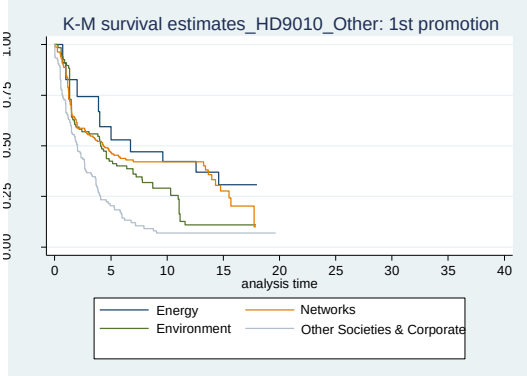


Fig. 3.20 Other. Historical Dataset 1991-2010. Kaplan-Meier survival estimates by business area

	1971-1990		1991-2010	
Other	**Freq.**	**Percent**	**Freq.**	**Percent**
Networks	39	46.43	75	30.61
Other Societies & Corporate	42	50.00	106	43.27
Heating & Services	.	.	.	.
Energy	1	1.19	10	4.08
Environment	2	2.38	54	22.04
Total	**84**	**100.00**	**245**	**100.00**

Tab. 3.18 Other societies. Business areas: Absolute and relative frequencies

Our concerns are confirmed by Fig. 3.19 where the Kaplan-Meier survival estimates, especially for the Networks area, show tardive first promotions. The situation changes in Fig. 3.20 and the "Other Societies & Corporate" holds here a trend consistent with our expectations, as well as Networks, for which the probability of being promoted is equal to 60% within 6 years of tenure (although with some exceptions in later time). The Energy area for people hired between 1991-2010 describes instead a situation where promotions are "spread" among years, but concerning only 10 people

Despite the limits that the group "Other" brings with itself due to its composition, we can still point out that a change between the period 1971-1990 and 1991-2010 happened. Both survival estimates curves on Networks and Other Societies & Corporate became more skewed, assuming this way the trend that characterizes the a2a Group first promotion pattern as it has been shown in paragraph 3.3.1.2.

A2a

Finally, only for descriptive purposes, we illustrate the dynamics of the a2a society, that is, the label we assigned to those people who became part of the Group starting from its foundation, and were not previously hired in other societies. Then, a comparison with previous times is not possible, given that the only sample we have at our disposal is the one about workers hired between 1991-2010.

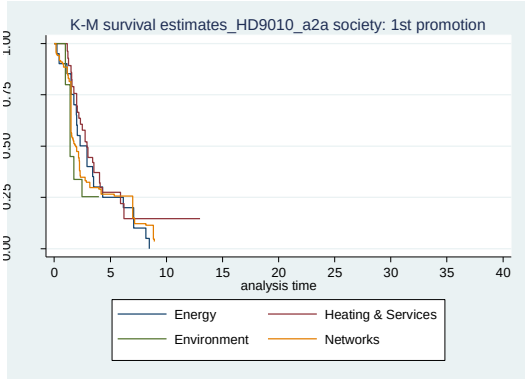


Fig. 3.21 a2a. Historical Dataset 1991-2010. Kaplan - Meier survival estimates by business area

	1991-2010	
a2a	**Freq.**	**Percent**
Networks	118	69.41
Other Societies & Corporate	.	.
Heating & Services	27	15.88
Energy	20	11.76
Environment	5	2.94
Total	**170**	**100.00**

Tab. 3.19 a2a. Business areas: Absolute and relative frequencies

Fig. 3.21clearly confirms what we have assumed and partially demonstrated until now – that is, there is a new logic that governs the first promotion inside the a2a Group. Regardless the area of business, the first change in the pay grade system is highly probable within five years of employment (75% of probability), whereas only few people got a promotion later.

These considerations are very important for the planning of the human resource management of the Group. In fact, with respect to the past where the system of promotions was slower, since the creation of the a2a as a private society something has changed. We only took into consideration the first promotion, because it is the one that interests almost all the a2a workforce – given its precocity in the eligibility. However, in the next sections, we want to go in depth by taking into consideration other aspects, such as individual variables that might make the promotion paths faster.

General consideration on the career paths compared between the pre and post privatization phase within each society

Analyzing in detail the promotion logics observed by periods of time and business areas, several considerations can be made.

First of all, problems in the data available on workers hired between 1971-1990s emerged for all the societies. Promotions are postponed during individuals' careers, as consequence of possible errors in the dataset. This could have biased the analyses on the general promotion trends of the Group, causing problems of reliability on our previous estimates. Moreover, splitting the 1971-1990 subsample by societies, reduces the number of people employed within each single category, causing issues of low generalizability of the associated findings.

Concerning the cluster of people hired between 1991 and 2010 – which will be the reference sample of our next analyses – we can observe a change in the speed within which job movements occur, with an acceleration inside all the business areas. At the same time, while the Aem career path still shows different trends according to the areas of business, in the case of Asm and A2a the curves are closer, rejecting hypothesis 2 on the existence of an internal labor market based on the business area. Instead, hypothesis 3 seems to be grounded, in that the transition towards the private sector has actually brought some changes in the human resource planning system in place. On one hand, the "minor" business areas increased the number of people employed inside them. On the other hand, the first job movement is faster for all the societies and business areas – with "a2a" as illustrative case of this new trend. In fact, "a2a" is the unique society that does not have a past history as public company, and so purely managed by private market logics.

3.3.3 Testing hypothesis 4.

The impact of some relevant individual covariates on the building process of internal labor markets

Previously we analyzed the dataset from an historical perspective, finding that differences between the way in which the a2a Group workforce was managed when the company was publicly owned and today do exist. In particular, whereas in the past the business area of reference seemed to play a role in shaping the career paths, during the '90s the situation changed, and individuals' job movements follow similar trajectories despite the area of business in which they are employed.

Given that this new way of managing people will probably characterize also the future policies adopted by the a2a Group, we decided to focus on the individual variables that can influence the occurrence of job changes.

In order to reach our purposes, we will adopt a new model of estimation – named "Cox proportional hazard" – applying it on several subsamples of data. The reference dataset is the cluster of people hired between 1991-2010s, that is the people who will be subjected to the new system of promotion. Further, instead of still focusing on the first promotion, we will firstly consider as failure the third change in the pay grade, accorded to people with higher seniority.

Once illustrated the dynamics that govern the third promotion, we will turn our attention on a new dataset, built according to the hiring pay grade levels.

Assuming that the impact of a certain number of promotions varies according to the pay grade in which an employee is hired, we will run several Cox models aimed at investigating the probabilities of the occurrence of several relevant promotions. This will allow us to draw some relevant considerations on the ways in which even the highest levels along the organizational chart are reached by the a2a Group employees.

3.3.3.1 Method: The Cox model

Until now we focused on the first job promotion considering mainly two different variables – the society of belonging, and the area of business – and relating them to some employees' characteristics, such as the job category, the level of education, and gender.

Now, we want to go more in depth in our study by concentrating on some other individual covariates that might influence the workers' career paths. As we anticipated, we will adopt a new model of estimation: the proportional hazard Cox model. The reason of our choice is that we do not have a clear idea about the shape of the time-dependence among variables, and moreover, we want to observe the direction of the effects of our covariates of interest. This model can be written in terms of the following hazard formula:

$$h(t, \mathbf{X}) = h_0(t)\, e^{\sum_{i=1}^{p} \beta_i X_i}$$

that gives an expression of the hazard at time *t* for an individual *i* with a given specification of explanatory variables denoted by **X**.

The hazard *h* is the product of two quantities. The first term h_0 is called 'baseline hazard' and is dependent on time; it is also an unspecified function, and this is the reason why the Cox model is called "semiparametric". The second part instead is the exponential expression of *e* to the linear sum of $\beta_i X_i$, where the sum is over the *p* explanatory *X* variables: it does not depend on time, and the *X*'s are called time-independent *X*'s (Kleinbaum D.G., Klein M. 2005).

The Cox PH model assumes that the hazard ratio – comparing any two specifications of predictors – is constant over time. Equivalently, this means that the hazard for one individual is proportional to the hazard for any other individual, where the proportionality constant is independent of time

There are several ways for checking the proportionality of hazards.

One is using graphical techniques. In particular, comparing the estimated –ln(-ln) survivor curves over different combination of categories of the variables being investigated. A second method is instead using a goodness of fit test, that provides large sample Z, or chi-square statistics, which can be computed for each variable in the model, adjusted for other variables present in the same model. The interpretation of the output etails that if the p-value is non-significant (i.e. greater than 0.10), than the proportionality assumption is reasonable; otherwise, a significant (small) p-value – say less than 0.05 – suggests that the variable being tested does not satisfy the PH assumption.

Although the graphical approach is less precise in giving an estimate of the goodness of the model, it has the advantage of showing possible criticisms and the points in time where assumptions are not met. In these cases, it is possible to modify the model by – for example – splitting the time duration in two subsamples.

Another way to face the violation of the proportionality assumption is by stratifying the model using the variable that does not fit the proportionality. In this case, we cannot have an estimate of the effect of the stratifying variable, but we can verify which is its impact on the coefficients of the other covariates being investigated.

3.3.3.2 The Cox model for the 1991-2010 dataset. Third Promotion

Previously, we adopted the first promotion as an event that could give a description of the logics that lie behind the human resource management of the a2a Group. Using Kaplan Meier survival estimate we discovered that mainly the first promotion happens within the first four years of employment, and this is true despite the range of time considered (at this purpose we split our dataset in 3 ranges: 1950-1970, 1971-1990, 1991-2010), the area of business, and the society. We also noticed that curves became more similar to each other in recent observations, especially for what concerns the business area – suggesting that a common policy of employees' promotion has been adopted once the a2a became a Group. The only exception is made

by the “Other Societies & Corporate”, but we explained this trend with the presence of more skilled workers concentrated in this category.

The promotion that we are going to use now is different from the previous paragraphs. In particular, in the Cox model we will take as a failure the third promotion. The reason of our choice is straightforward. Whereas the first promotion gives us an imagine of a general trend that interests almost all the workers inside the a2a Group, the third promotion is different, in that the average tenure of people when it is accorded is equal to 6.08, with a standard deviation of 3.23 (for the first promotion it was equal to 2.70, SD of 3.10). We can assume that people who manifest such tenure are the ones that are going to stay inside the company, and for whom promotions may be accorded also for merit, and not only for seniority.

Lastly, we will start our analyses from the 1991-2010 dataset. This for several reason. First of all, because these are the more recent data. Secondly, it is the unique range of time where the company takes the shape it holds today; moreover, during these years, the human resource management system became more uniform among the societies and business areas, making this trend the more predictive of the future HR practices.

Over 2,192 subjects are part of the 1991-2010 dataset and, 1,015 of them got the third promotion. The shape of the survival curve is the following:

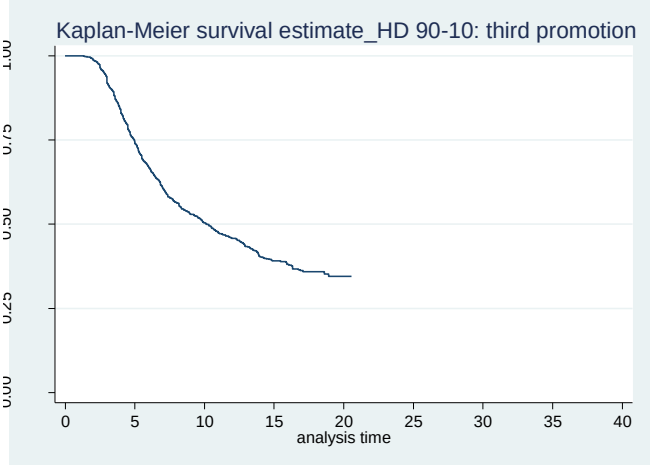


Fig. 3.22 Historical Dataset 1991-2010. a2a Group: 3rd change of pay grade

The 50% of probability of being promoted occurs after more than 10 years of employment.

Taking into consideration the job category, employees that got this promotion are both White and Blue collar ones (48 vs 50 percent), and only the 2% is represented by Executives.

From the point of view of the society and the business area, we are dealing with the following trends:

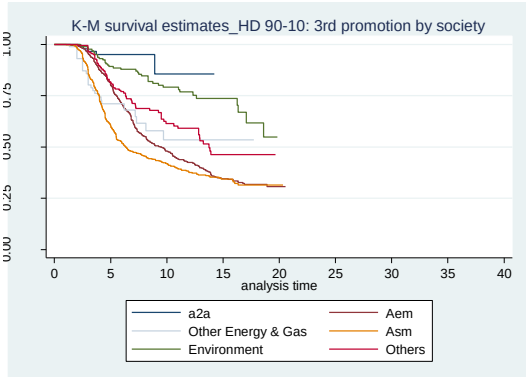


Fig. 3.23 Historical Dataset 90-10. a2a group by society

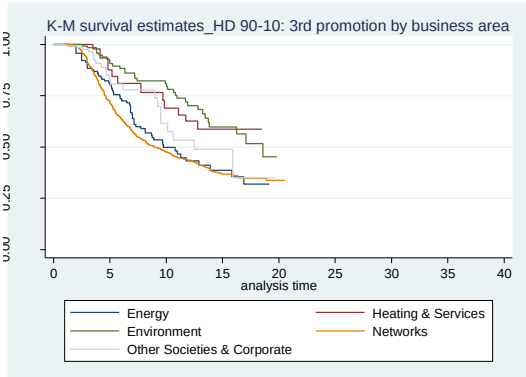


Fig. 3.24 Historical Dataset 90-10. a2a group by business area

Fig 3.23 shows that Asm curve is more skewed, that is because people fail the third time sooner with respect to the other companies. The same is true also for the Other Energy & Gas workforce, although this subsample is composed by only the 2.6% of the total failure observations. In this graph, differently from what happened when taking into consideration the first promotion, we can see that for workers hired between 1991-2010s, trends among companies are not similar. In fact, Aem, Others, and Environment clearly postpone the third promotion later on in time. Taking as a reference point the value of 0.60 along the y-axis, we can see that the 40% of probability of promotion occurs at 6 years for Asm, 8 for Aem and Other Energy & Gas, 11 for Others, and 19 for the Environment societies. Instead, a2a doesn't get this probability; its sample is composed only by 5 individuals, and this due to the fact that the society was founded in 1999, and then – given that the third promotion is accorded on average after 6 years – only few employees experience it.

From the estimates on the business areas (Fig. 3.24), we see that Network and Energy are the ones where promotions occur within the seventh year for the majority of the employees. This is quite surprising, above all for the less skewed curve of Other Societies & Corporate, where traditionally the more skilled workers are employed. However, this category, as well as Heating & Service and Environment, are the less populated ones (they collect about the five percent of the overall population). Finally, the Environment pattern is peculiar, in that the third promotion is a rare event – confirming the past trends in this area.

Overall, the situation completely changes as far as the third promotion is concerned. Curves on both the society and the business areas are distant from each other, suggesting that for some categories of these two variables the third job movement is delayed.

Given that from survival estimates we cannot make assumptions about the reasons behind such differences, in the next sections we will apply Cox models aimed at

estimating the impact that several individual covariates might influence the occurrence of this event.

Certainly, we know that the third promotion concerns a restricted sample of people with respect to the first one; moreover, it does not seem that neither the society, nor the business area contribute in generating a separate internal labor market, in that invalidating both hypothesis 1 and 2.

For this reason, we developed a fourth hypothesis, according to which it can be that – as far as a higher number of job movements are concerned – the determinants for the eligibility of the promotion recognition is the presence of some individual characteristics, instead of organizational variables.

The first step in the Cox analysis is to verify the proportionality assumption of the hazard ratios. Unfortunately, we observe that these assumptions are not satisfied for some variables and in particular for the job category and gender. Also the educational level does not have proportional hazard ratios, but the importance of this variable is secondary with respect to the job level.

Despite this fact, we included in our model all the categories of all the variables substantively relevant for our investigation; we did so for two reasons. First of all, the proportional hazard assumption is fundamental as far as transitions events are concerned – that is, when the time is an essential variable. This is not the case of our estimates, given that we are studying the occurrence of a specific event – the third promotion – during one's individual career. In other words, we are not observing the probability of the transition from the second to the third change in the pay grade – for which the proportionality assumption is crucial – but only the probability of being promoted at least a certain number of times.

Because of the characteristics of our estimates, we could also have adopted a logit model. We actually run the same analyses also with a logit, finding that the output is very closed to the Cox one. According to the literature on the survival analysis techniques (see Blossfeld, Golsch, Rohwer 2007), this is not surprising, given that the Cox model is a very versatile model of estimation.

A second reason for which we included also the categories that did not respect the PH assumption, is for the goodness of our model, given that this allows us to work on a larger dataset, obtaining a better picture of the job promotion system in place inside the a2a Group.

Finally, we will consider as relevant covariates the following variables:

- Society;
- Business area;
- Gender;
- Tenure.

We didn't include the job category. This is not due to the fact that we do not consider this covariate as relevant. Contrary, we decided to adopt it as a stratification variable. In fact, according to Kleinbaum and Klein (2005), a variable that does not satisfy the PH assumption can be used as "stratification variable" because in this way we can create a "stratified Cox model" that allows for control by "stratification". In the general formula, a stratified Cox model is composed by k variables that do not satisfy the PH assumption – in our case the job category – and p variables that satisfy it. The variables not satisfying the PH assumption are denoted as $Z_1, Z_2, \ldots, Z_k$, while the satisfying ones are $X_1, X_2, \ldots, X_p$.

To perform the stratified Cox (SC) procedure, we define a single new variable, which we call Z^*, from the Z's to be used for stratification. We do this by forming categories of each Z_i, including those Z_i that are interval variables. We then form combinations of categories, and these combinations are our strata. These strata are categories of the new variable Z^*, and are called k^*. The general hazard function form for the stratified Cox model is the following:

$$h_g(t, \mathbf{X}) = h_{0g}\exp[\beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_p X_p]$$

$g = 1,2, \ldots\ldots, k^*$, strata defined from Z^*

the variable Z^* is not explicitly included in the model, whereas the X's assumed to satisfy the PH assumption are. Moreover, the fundamental characteristic of this model is that the baseline hazard function $h_{0g}(t)$ is allowed to be different for each stratum, whereas the coefficient $\beta_1, \beta_2, \ldots, \beta_p$ are the same. It follows that the fitted SC model will yield different estimated survival curves for each stratum, because the baseline hazard functions for each category of the strata variable vary. However, because the coefficients of the X's are the same for each stratum, estimates of the hazard ratios do not change. This feature of the SC model is called "no-interaction" assumption.

Considering the job category as the stratifying variable, we obtain these estimates:

VARIABLES	(Model 1) _t	(Model 2) _t	(Model 3) _t	(Model 4) _t
SOCIETY **(Aem ref.var.)**				
Asm	1.242***	1.262***	1.264***	1.220***
	(0.0848)	(0.0867)	(0.0868)	(0.0934)
Others	0.684***	0.800	0.801	0.793*
	(0.0881)	(0.110)	(0.110)	(0.109)
Environment	0.336***	0.381***	0.381***	0.381***
	(0.0576)	(0.0669)	(0.0670)	(0.0683)
A2a	0.140***	0.152***	0.152***	0.151***
	(0.0631)	(0.0688)	(0.0686)	(0.0685)
Other Energy & Gas	1.051	1.044	1.039	0.962
	(0.209)	(0.216)	(0.215)	(0.200)
missing	2.816	2.791	2.856	1.949
	(2.828)	(2.804)	(2.873)	(1.967)
BUSINESS AREA **(Networks ref.var)**				
Energy		1.029	1.038	0.966
		(0.144)	(0.146)	(0.138)
Environment		0.585***	0.585***	0.542***
		(0.111)	(0.111)	(0.103)
Other Societies & Corporate		0.792	0.797	0.784
		(0.174)	(0.175)	(0.173)
Heating & Services		0.644	0.639	0.579*
		(0.181)	(0.180)	(0.163)
missing		1	1	1
		(0)	(0)	(0)
GENDER **(Male ref.cat)**				
Female			0.960	0.950
			(0.0890)	(0.0884)
SENIORITY **(0 – 4.9 years ref.cat.)**				
5.0 – 9.9 years				0.530***
				(0.0912)
10.0 – 19.9 years				0.409***
				(0.0670)
20.0 – 29.9 years				0.385
				(0.391)
missing				0.418***
				(0.0755)
Observations	**6,208**	**6,208**	**6,208**	**6,208**

seEform in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Tab. 3.20 a2a Group. Historical Dataset 1991-2010: third promotion.
Cox proportional hazard model stratified by job category

The coefficients report the hazard ratios of the chosen categories for the variables of interest. The hazard ratio expresses the probability of being promoted in relation to another category of reference belonging from the same variable. We reported in parenthesis the reference category under the name of the covariate considered, and we chose them taking into consideration the more populated category, or – if the variable is ordinal – the first one in the order list. It follows that reference variables are respectively: "Aem" for society, "Network" in business area, "Male" in gender, and "0-4.9" in seniority. "Seniority" is the range of years in which the promotion occurs; in other words, it is the individual tenure when the promotion is accorded. Given that we are analyzing the third job change – accorded on average after 6 years of employment (standard deviation 3.23) – we should aspect a positive hazard ratio inside the category 0-4.9 or 5.0-9.9 of the seniority labels, because these are the two ranges in which usually people get the third promotion.

In order to give a picture of the hiring policies in place inside the a2a Group, we can see that:

	Educational Level				
Age at hiring time	Primary School	High School	Others & Vocational	University	Total
17.0-24.9	67	513	69	36	685
	9.78	74.89	10.07	5.26	100.00
25.0-29.9	100	301	50	175	626
	15.97	48.08	7.99	27.96	100.00
30.0-39.9	169	259	56	80	564
	29.96	45.92	9.93	14.18	100.00
40.0+	117	68	21	6	212
	55.19	32.08	9.91	2.83	100.00
Total	**453**	**1,141**	**196**	**297**	**2,087**
	21.71	**54.67**	**9.39**	**14.23**	**100.00**

Tab. 3.21 Historical Dataset 1991-2010. a2a Group: Age at hiring time by Educational Level. Absolute frequencies and row percentages

The majority of people is hired in the range of age 17.9-30.0, indicating that once finished the high school or the university, they became part of the a2a Group workforce. This is confirmed by data on the educational level calculated by range of age at the hiring date, where it emerges as the group 17.0-24.9 holds workers with a

diploma or a lower educational title (almost 95%), whereas the 25.0-29.9 the majority of graduate people (28%). The other categories instead collect a prevalence of low educational titles (primary and high school).

This data may be interpreted as the fact that people in the a2a Group start working for the company since the beginning of their job career. This, considered together with the long years of tenure, allows us to study the job promotion system even more accurately: if one person, since the beginning of his/her career is employed in a unique workplace, then the job movements can be analyzed from a critical perspective, taking into consideration several variables that might influence the probability of being promoted.

At this purpose, we estimated four models in Tab 3.20. In the first (Model 1), we considered only the variable society, in the second (Model 2) society was estimate together with business area; in the third (Model 3), we considered also gender, and finally in Model 4 estimates of the seniority variable are reported.

In Model 1, the Asm hazard ratio of 1.24 tells us that to be a worker in this society gives a probability of being promoted for the third time similar to the one of the reference variable Aem. The situation is completely different for the Environment and a2a societies, where the hazards closed to zero indicate a negative relation with the Aem category. Specifically, being a worker in the Environment societies gives a probability of three times lover with respect to Aem, confirming the past tendencies of slower career paths; finally to be employed in a2a makes the probability of the third promotion occurrence seven times lower. This last relationship can be related to the fact that a2a is a young society, then the probability of the third change in the pay grade system – that intrinsically implies a certain years of tenure – is less likely with respect of Aem and Asm, companies with a longer history. The other two categories – Other Energy & Gas and *missing* – do not show significant coefficients, making their estimates not reliable.

In Model 2, the variable Business Area is introduced. The estimates of "Society" do not change a lot, showing that the impact of the business area does not overwhelm it. The Environment is the unique category with a three-stars hazard ratio, once more time indicative of a negative relationship – even though less strong with respect to the Environment societies. In this model, to be part of the environmental business area means a probability of promotion 1,7 times lower with respect to the Networks. Probably, the negative impact is reduced by the fact that the sample is very small, and not all the workers of the Environment societies work in the Environment business area. In fact, we should remember that the Networks area is the prevalent, and employs about the 70% of the a2a Group workforce. This might be an explanation also for the non-significance of the estimates of the other business area categories.

Model 3, takes into account the impact of gender, but the estimate is non-significant.

Finally, Model 4 considers together the previous variables plus seniority. It emerges that the higher the years of seniority, the worse the probability for the third promotion occurrence. The category 0-4.9 seems to be the one where the event occurs more likely, in that all the hazard ratios of the other categories are closed to 0 – indicating a negative relationship. Concerning this finding, we could assert that probably, according to what we discovered on the more recent promotion trends, today the a2a Group is speeding the individuals' job movements, making it more likely to happen within 5 years.

In general, Model 5 depicts the impact of all the variables considered together. Given that the coefficients are similar to the ones estimated in the previous models, we can say that there is not a single individual characteristic that plays a decisive impact on the occurrence of the third promotion.

In these paragraphs we discussed a stratified model by job category. We decided to adopt it as a stratifying variable in that it does not satisfy the proportional hazard assumption; additionally, we tried to run models including it as an independent

variable, obtaining non-significant coefficients. Given that we believe that job category might be an important variable that can shape the promotion system, using it as a stratifying variable allows us to control for its effect on the other covariates.

According to the structure of the stratified Cox PH model, we can elaborate a variable *Z** that contains combinations of categories of each independent variable divided by the strata correspondent to the job category.

For instance, we believe that a distinction for the Asm career paths considered in the range of seniority of 0-9.9 years concerning the third promotion, distinct by blue and white collars might contribute to give us an image of how career paths are handled by the a2a Group.

Running the Kaplan-Meier survival estimates and representing them in a graph, we obtain the following trends:

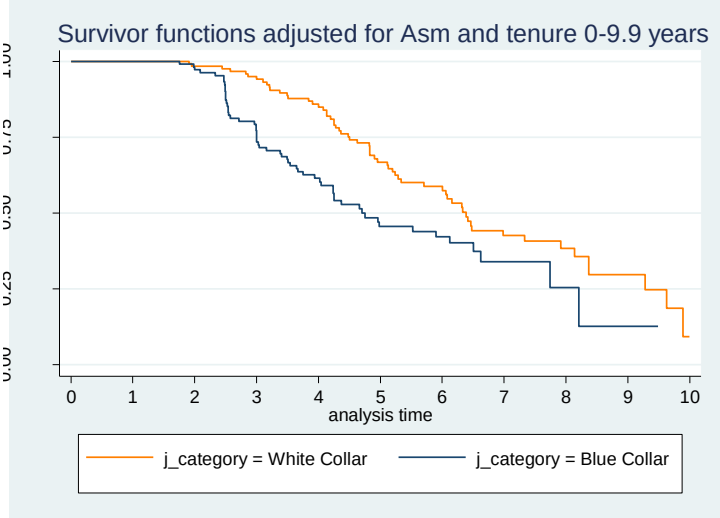


Fig. 3.25 a2a Group, Historical Dataset 1991-2010. Survivor functions adjusted for Asm and Tenure 0-9.9. Stratified by job category

The graph shows that the promotions are accorded faster to Blue Collars with respect to White collars in Asm. In fact, on equal terms of job seniority, and taking as comparative point the 50% of probability of being promoted for the third time, we can see that this event interests Blue Collars after less than 5 years, and White Collars after

6,5 years. Further, we checked the two categories in order to verify if the difference was due to an higher number of employees in one category with respect to the other, but this is not the case. In fact, the percentage of Blue collars is equal to 50%, whereas White Collars are the 48%.

Summarizing, the graph of Fig. 3.25 tells us that in Asm, among the people that have a tenure included between 0 and 10 years of employment, White Collars experience the third change in the pay grade with an average delay of two years with respect to their colleagues Blue Collars.

We adopt the same logic observing the workers of the Environment society by job category, obtaining the following graph:

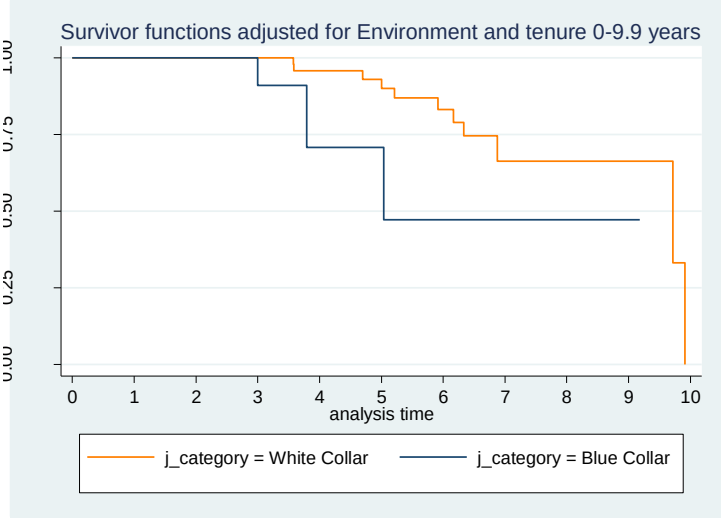


Fig. 3.26 a2a Group, Historical Dataset 1991-2010. Survivor functions adjusted for Environment and Tenure 0-9.9.
Stratified by job category

People getting the third promotion are totally 70, of which 40 White Collars and 28 Blue Collars (plus 2 Executives). The curves are less packed than the previous ones of Fig. 3.25, but we still decided to use them with comparative purposes. First of all, it emerges that the probability of the third change in the pay grade is very low, and included between 0 and 25% for White Collars, and between 0 and 50% for Blue Collars. Once more time, Blue Collars experiment the job movement sooner, although

for both the categories the slowness of the career paths is here evident. This graph further confirms what previously Kaplan Meier and Cox models asserted, that is Environment societies manage their employees with slower career plans.

We decided to include these two graph in order to show two completely different situations. One concerns Asm, that from Cox PH estimates emerges as a society in which people get changes in the pay grade system faster; the other is Environment, that depicts the exact opposite situation, that is slow career paths and a less skilled workforce.

3.3.3.3 Comparison among promotions and estimates of the impact of the pay grade level

Until now we discussed the third promotion recurring to the stratified Cox PH model by job category, and creating new variables containing certain categories of the covariates used as independent variables in the original Cox model.

However, the third promotion is not the ending point of the career path inside the a2a Group. Over the entire dataset, the maximum number of job movements accorded to a single worker are twelve.

In the dataset representing people hired between 1991 and 2010, eleven is the higher number of promotions. In Tab. 3.22 we report the number of the promotions taken into consideration, and their absolute and relative frequencies:

Promotions	Freq.	Percent	Cum
1	2,135	34.39	34.39
2	1,342	21.62	56.01
3	1,015	16.35	72.36
4	719	11.58	83.94
5	478	7.70	91.64
6	277	4.46	96.10
7	148	2.38	98.49
8	56	0.90	99.39
9	26	0.42	99.81
10	11	0.18	99.98
11	1	0.02	
12	.	.	
Total	6,208	100	

Tab. 3.22 Number of promotions. Absolute relative frequencies

Pay Grade	Energy	Gas-Water	Trade	Garbage	Chemical	Telec.
1	QS	Q	Q	Q	Q1	Q
2	Q				Q2/Q3	
3	ASS	8	1	8	B1	7
4	AS				B2	
5	A1S	7	2	7A	C1	6
6	A1			7B	C2	
7	BSS	6	3	6	D1	5
8	BS	5		5	D2	
9	B1S	4		4	D3	
10	B1	3		3	E1	4
11	B2S	2	4	2A	E2	
12	B2			2B	E3	3
13	CS	1	5	1	E4	
14	C1				E5	

Tab. 3.23. a2a Group: Pay Grade Levels, table of and equivalence

Obviously, the higher the number of promotions, the fewer the people that got it. This for several reasons.

First of all, the seniority. The longer the years of seniority, the better the probability of getting a lot of changes in the pay grade system, for two reasons: automatic changes in the contractual conditions established by the national collective agreement of the industrial sector, and for individual rewards assigned to the workers following their good performances.

Another fact that can influence the number of job movements is the hiring position within the pay grade system of Tab. 3.23. Since the creation of the a2a Group, a uniform system of human resource management is in place. The old criteria within which employees were assigned to a certain position, according to the society (Aem, Asm, Environment, etc.), the area of business, and the job category, are now harmonized. Today, the contractual levels are fourteen, corresponding to the job and the competencies held by employees. Obviously, the fourteenth position (that corresponds to the lower level), is usually reserved to blue collar jobs, whereas

executives and managers might be hired directly from higher levels (red and green cells). Consequently, and coming back to the analysis on the higher number of promotions, only Blue and White Collars can get more than four promotions.

From Tab. 3.22, we can note that the first four changes in the pay grade system interest a percentage of people equal to more than 80%. This is due to the fact that this is the number of promotions that can be experienced by almost all the employees, despite their job category.

Instead, when we study promotions higher that four, we are focusing on the career of a specific branch of the workforce that excludes Executives and Managers: thus, promotions from the fifth to the eleventh give us an image of how Blue and White Collars are managed inside the company.

Observing separately each single promotion, we discover that hazard ratios are very close to each other, with a constant positive effect of Asm, and a negative one for the other categories of societies, especially Environment (for all the Cox Model see the Appendix). The same consideration holds for the Business area, where the two categories that manifest a positive probability are "Energy", and "Heating & Services". Energy has a coefficient of 1.164 and 1.579 for the eight and the tenth promotion – although non-significant – whereas Heating & Services holds a significant hazard ratio for the ninth promotion, equal to 5.441. Environment, and Other Societies & Corporate are instead closed to zero, showing negative probabilities of being promoted with respect to Networks. We remind that these estimates are stratified for job category, hence we are controlling, even if implicitly, for the impact of this variable.

Gender remains a covariate that does not show significant effects, even though the estimates are slightly higher than one, hence manifesting a similar path for women and men.

Data on seniority instead, indicate that promotions are likely to happen within the ranges 5-19.9 from the fifth promotions onwards, and this is not surprising given the seniority of those people involved, who are the ones that stay longer inside the company.

We believe that a focus on each promotion considered separately from the other is important, because in this way we can depict a general imagine of the promotion system in place inside the a2a Group. The analyses are further strengthened by the fact that our models are stratified by job category, and then they consider the impact of this variable on the other hazard ratios. However, we cannot omit what we outlined in the beginning of this section – that is – the impact of the job level in which people are hired inside the group. Being a Blue Collar *vs* an Executive makes a difference in the number of promotion experienced. This is the reason why in the descriptive paragraphs we decided to focus on the first promotion, and only in a second time we adopted the third change inside the pay grade system as dependent variable. In fact, with the first promotion we included all the workers in our analyses, whereas with the third one some restrictions might be applied according to the hiring pay grade. Following this consideration, we believe that it might be relevant to study the company recurring to subsamples of workers that take into consideration this factor.

In order to accomplish our goals, we created a new categorical variable that describes the job position within which the employee has been hired. This is different from the job category – divided in Manager, Executive, White and Blue Collar – in that we took as parameter of classification both the job level (its number), and the type of job according to the harmonized typology adopted by the a2a Group (see Tab. 3.23). Pay grades (PG) are managed as follow:

- Blue Collar PG. From the 14th until the 9th level, O1 and O2 (a2a Group common classification). Handy jobs;
- White Collar PG. From the 8th until the 5th, P1-P2. Roles of responsibility and specialized jobs;
- Executive-Manager PG. From the 4th onward, P3 level. Expert and managerial jobs.

According to these criteria, workers hired between 1991-2010 are organized as follow:

Pay grade level	Freq.	Percent	Cum.
Blue Collar PG	1,382	66.22	66.22
White Collar PG	500	23.96	90.18
Executive/Manager PG	205	9.82	100.00
Total	2,087	100.00	

Tab. 3.24 a2a Group, Historical Dataset 1991-2010: Pay grade levels. Absolute and relative frequencies

From Table 3.24 we can see that people employed in a pay grade ascribable to Blue Collar position are the 66.22 percent of the total, although the job category of Blue Collars in the 1991-2010 dataset is equal to the 51% percent. Consequently, around the 15% of people that figure inside the Blue Collar pay grade level, are not hired inside the "Blue Collar" job category. We verify the reliability of our new variable by checking if this discrepancy interested also the original dataset, that is the one that collects all the observations (and not only those of people hired between 1991-2010). It emerged that over the 30% of workers employed as Blue Collar and 30% hired as White Collars, there are the 30% of employees in the Blue Collar pay grade level and 17% in the White Collar PG. Given that the elaboration of the pay grade typology is motivated by theoretical reason, with the strong support of the triple check of the criteria adopted by both the company, the job title, and the number of levels, we believe that – despite this incongruence – the variable can still be considered reliable.

The high percentage of observations inside the Blue Collar PG category can be linked to the fact that the level within which both Blue and White collars are hired, is often the fourteenth. Consequently, given that we are going to analyze promotions higher that 1, this won't invalidate our findings.

In order to study more in depth the career path inside the a2a Group, and to overwhelm the limitations due to an exclusive focus on the number of promotions, we built three new datasets that contain observations on the three pay grade levels

considered. This allow us to study the logics of promotions of Executive, White and Blue Collar positions respectively, taking into consideration that – for example – three promotions starting from an Executive pay grade level mean something different that the same amount for the Blue Collar PG.

For each dataset we illustrate the survival curves of the promotions considered.

For the Executive pay grade levels we show the trend of all the promotions, for a total of three survival curves. Further, considerations on the societies and business area trends will be depicted along the Cox PH model discussion, that will concern the lower number of promotion for this category, that is one.

On the White Collar pay grade instead, we firstly show the trend of the second promotion, because it delineates the transition from basic to specialized jobs. Further, given that one person can be also promoted to the Executive pay grade level, we trace the scenario for the fourth promotion, and for the sixth – that is number of job movements necessary in order to became a Manager. In this way, with a Cox model we can verify what are the characteristics that can make one's career more likely to occur. At this purpose, we decided to include among the covariates of interest also the educational level, trying to verify if more skilled workers are the ones for which the job changes are more likely to happen.

Finally, the Blue Collar pay grade is the more complex, due to the fact that the potential number of promotions is higher with respect to the other categories. For this reason, we follow the same logic that we adopted for the White Collar pay grade. In the first place, we study the fifth promotion, that allows for the completion of the Blue Collar pay grade career. After, we focus on the ninth promotion, thanks to whom a person can reach the highest position inside the White Collar pay grade. Finally, the promotions higher than nine will be grouped in a unique category, aimed at seeing the characteristics of these people that went through all the levels of the a2a Group career system.

Our considerations on the number of promotions assume that people inside each pay grade start their job movements from the lower level. This might not be the case for all the individuals, in that a person can also start his/her career from a higher level. We believe that this limitation can be overwhelmed by the fact that we are not studying exclusively one promotion. Contrary, in the previous paragraphs we already considered different number of promotions. Moreover, within each pay grade category, we take into consideration several job changes according to different criteria. It follows that the evaluations we are going to depict might not be complete, but surely can be considerate exhaustive of the general trends that interest the pay grades and the a2a Group in general.

Another issue may concerns the validity of the estimates concerning the higher number of promotions for the Blue Collars pay grade level. In fact, the dimension of this subsample can be too small in order to get reliable coefficients. However, we decided to still include these analyses in that we believe that a career path of this sort is very interesting to study from a theoretical point of view.

Executive-Manager pay grade

We start our analyses from the Executive pay grade. It is composed by both Executive and Managerial position. It includes 4 levels of pay grades, and then – as we have anticipated – the maximum amount of job movements is three.

Here we reported the survival estimate curves of each promotion.

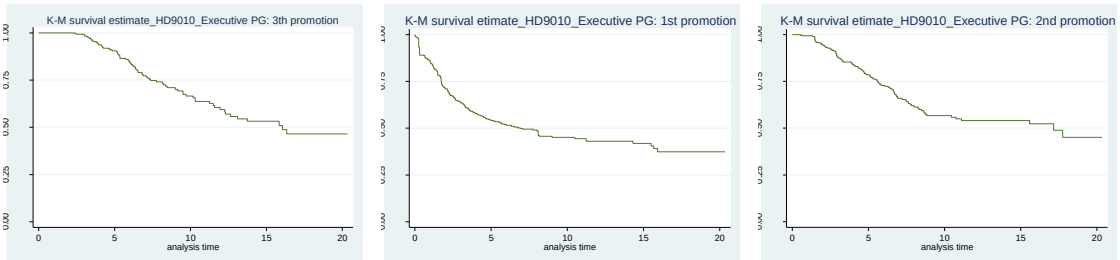


Fig. 3.27 a2a Group. Historical Dataset 1991-2010. Executive pay grade level: first, second and third promotion

The tenure reported in these graphs is equal to 20 years. This because the dataset concerns people hired in recent years, and then with a shorter tenure.

At a first glance, and confirming the general trends, the curve on the first promotion is more skewed, showing that it happens sooner with respect to the others. Considering the 40% as the reference probability of being promoted (0.60 on the y-axis), we can see that it occurs after 4 years for the first change in the pay grade, after 8 years for the second, and 12 for the third. The difference is around 4 years among promotions, suggesting that these are postponed with respect the general difference of 2 years that characterized the system when the pay grade level was not considered. The subjects involved are respectively: 203, 107, and 76 over a sample of 370 people.

For what that concerns the other variables that we analyzed in the previous paragraphs and that might play a role in the shaping process of the human resource management system, we decided to run a Cox model on the first job change. Our choice is motivated by the fact that the other promotions occur only for a small number of people, and then coefficients can be non-significant. Moreover, we are dealing with the highest job positions inside the company, so it is reasonable to assume that not all the employees are promoted for a highest number of times. Furthermore, considering the first job change we can also include in our sample these people that are employed in the second and in the third Executive pay grade level.

In the next page Cox estimates are reported:

VARIABLES	(Model 1) _t	(Model 2) _t	(Model 3) _t	(Model 4) _t	(Model 5) _t
SOCIETY (Aem ref.cat.)					
Asm	0.969	0.963	0.900	0.900	1.669*
	(0.217)	(0.216)	(0.203)	(0.203)	(0.444)
Others	2.770***	1.338	1.091	1.092	0.926
	(0.627)	(0.427)	(0.377)	(0.377)	(0.384)
Environment	3.101***	3.062***	2.033***	2.035***	3.845***
	(0.615)	(0.634)	(0.444)	(0.445)	(0.998)
A2a	3.079***	4.197***	4.104***	4.103***	3.397***
	(0.817)	(1.211)	(1.236)	(1.236)	(1.079)
Other Energy & Gas	2.125**	2.338**	2.269**	2.265**	2.330*
	(0.661)	(0.887)	(0.869)	(0.870)	(1.025)
missing	15.32***	16.26***	12.77***	12.74***	10.96***
	(11.22)	(11.93)	(9.460)	(9.447)	(8.639)
BUSINESS AREA (Networks ref.cat)					
Energy		0.893	1.061	1.064	0.970
		(0.274)	(0.330)	(0.332)	(0.345)
Environment		1.527	1.375	1.373	0.832
		(0.577)	(0.529)	(0.529)	(0.341)
Other Societies & Corporate		3.382***	2.675***	2.672***	2.125*
		(1.099)	(0.972)	(0.970)	(0.926)
Heating & Services		0.475**	0.437**	0.436**	0.226***
		(0.179)	(0.177)	(0.177)	(0.0979)
missing		1	1	1	1
		(0)	(0)	(0)	(0)
EDUCATIONAL LEVEL (High School Diploma ref.cat.)					
Primary School			2.836***	2.826***	3.678***
			(0.599)	(0.607)	(0.855)
Others & Vocational			3.599***	3.585***	4.696***
			(0.961)	(0.969)	(1.326)
University Degree			0.789	0.791	0.730*
			(0.147)	(0.149)	(0.140)
GENDER (Male ref.cat)					
Female				0.982	0.776
				(0.197)	(0.160)
SENIORITY (0 – 4.9 years ref.cat.)					
5.0 – 9.9 years					0.812
					(0.230)
10.0 – 19.9 years					0.287***
					(0.0844)
20.0 – 29.9 years					0
					(0)
missing					1.838**
					(0.519)
Observations	**502**	**502**	**502**	**502**	**502**

seEform in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Tab. 3.25 a2a Group. Historical Dataset 1991-2010. Executive-Manager pay grade: first promotion. Cox proportional hazard model

Cox proportional hazard estimates for the variable "society" give us unexpected results. In fact, it emerges that all the categories of the society variable have a higher probability of being promoted the first time in the Executive pay grade levels with respect to Aem employee, except for Asm (but its coefficient is non-significant). The estimate of "Environment" is the more surprising, given that it triples the probability; this is opposite to the past trends, where people on these societies got promotions later in time. When controlling for the business area, we discover that the unique category that has a significant and positive impact is "Other Society & Corporate", for which the probability is three times if compared to Networks. Then, we checked crossing data on society and business area in order to verify if the estimate of Environment was the result of a high number of people belonging from these societies hired in the Corporate area. This is not the case, given that the more populated area inside the Environment societies still remains the "Networks".

Model 3 includes in the analyses also the Educational level. Coefficients remain positive, with 2.8 and 3.5 times the hazard ratio for the promotion for people that hold a primary school or a vocational title, with respect of having a high school diploma. We motivate this finding by suggesting that these are people who have an higher tenure inside the company – hence, it is not the educational level itself that explains the promotion, but the other way around, that is: those people that have such titles are the ones who remained inside the company the most, and then, they got promoted an higher number of times.

Once more time, "Gender" does not make the difference – its coefficient is non-significant. Finally, data on seniority tell us that it is more likely to be promoted inside the Executive pay grade level if the tenure is included between 0 and 4.9 years, and this is coherent with the fact that we are analyzing the first change, and so the one that happens sooner in time.

White Collar pay grade

The second pay grade analyzed is "white collar". As descriptive statistics show, white collars represent the second largest category of workers, after blue collars. It follows that data on this pay grade level should be consistent, given the dimension of the subsample analyzed.

We anticipated – when we introduced the Cox models concerning the white collar pay grade levels – that for the Cox model estimates we take into consideration three failures numbers: the second, the fourth and the sixth. We opted for these specific numbers because:

- Two promotions. Assuming that one begins his/her career from the lowest category within the white collar pay grade, this is the number of promotions necessary to reach specialized tasks;
- Four promotions. It involves those people that reached the Executive pay grade level after being hired inside the white collar one;
- Six promotions. It depicts the "complete" career, form the White Collar pay grade level, until the managerial one. We assume that this sample will be very small, but we still are interested in analyzing which are the characteristics of those people that made a similar career path.

For descriptive reasons we report the Kaplan-Meier survival curves of all the White Collar pay grade changes:

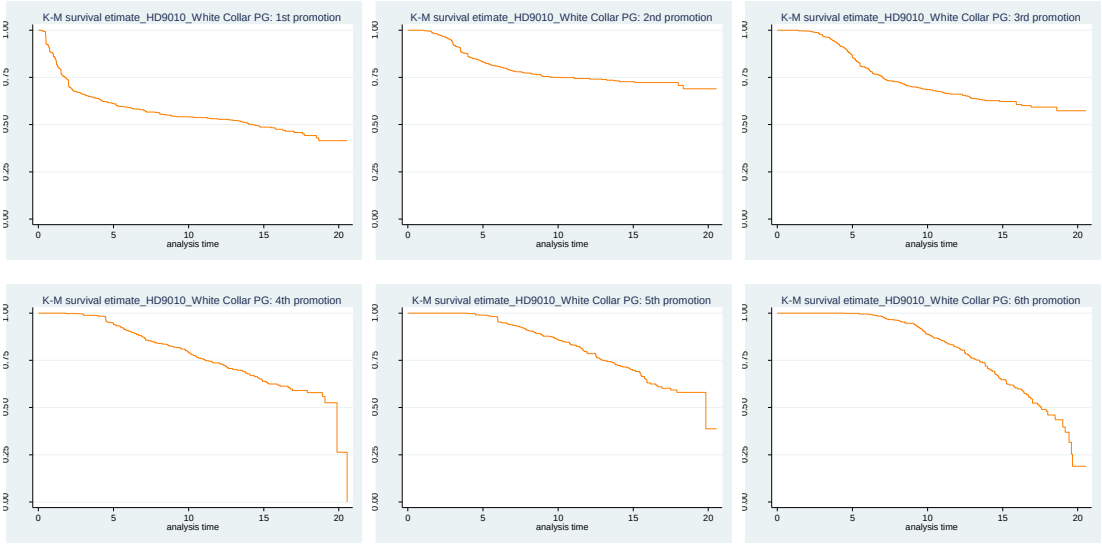


Fig. 3.28 a2a Group. Historical Dataset 1991-2010. White Collar pay grade level: 1st-6th promotion

The graphs show a very interesting pattern. The first promotion is obtained with a probability of the 40% within 4 years of tenure, but the situation completely changes as far as the second change in the pay grade is concerned. Here, we can see that the shape of the curve is less skewed and assumes an almost flat trend, suggesting that this is a less lukely event.

The slope becomes more skewed for the third promotion, where after six years there is the 25% of probability of being promoted. The fourth, the fifth, and the sixth curves have a more steep path, beginning from 5, 6, and 7 years respectively. Such trends may be interpreted in the sense that only a small number of people is promoted more than one time within the white collar pay grade. However, for those that overwhelm this step, the following promotions are more luckily to happen. In this regards, we are facing a typical situation in which the company decides to whom invest on in terms of career development, and once people are chosen, their career path assumes a “vertical” shape.

In this respect, Cox models are very useful in order to evaluate the impact on the individual characteristics on the probability of being promoted.

Considering the "society" variable, we obtain significant and positive coefficients with respect to Aem respectively in the categories: Asm (1.972***), Others (2.064***), and Other Energy & Gas (2.057**) as far as the second change in the pay grade is concerned. The impact remains positive in the fourth change for Other Energy & Gas (3.566***), whereas all the other categories have non-significant coefficients. Finally, concerning the sixth promotion, Asm holds an hazard ratio of 2.569***, confirming the positive relationship between being an Asm worker and being promoted. These coefficients confirm what we suggest before – that is the second promotion can be considered a "bottleneck" through which only certain workers have access, and that determinates who are the ones that will proceed in their careers. In this regards, it seems that Asm is the society that guarantees better career opportunities for its employees.

When also the business area is included in the model, only "Energy" has significant hazard ratio inside the fourth promotion model (for the second and the sixth all the coefficients are non-significant): the change is more likely to happen of 1.7 times – then, it is very close to the reference variable "Networks".

As we did previously when we were analyzing the Executive pay grade level, we also considered the "Educational level" as a relevant variable. It turned out that "university" holds a strong e significant effect of 4.5 three-stars hazard ratio with respect to the high school diploma in the second promotion, while "primary school" and "other & vocational" are significant, but negative in the fourth promotion. None of the coefficients concerning the level of education are significant inside the six changes white collar pay grade model.

Finally, "gender" is significant and negative only for the sixth promotion (female are promoted 1,7 times less luckily than men), and "seniority" shows a controversial impact, in that the only significant hazard ratio is reported in the category "seniority 10-19.9 years" with a negative sign in the fourth promotion model, and positive of 1.5 hazard ratio in the sixth one (the reference category in this case is tenure 0-4.9 years).

Some general considerations can be elaborated from these estimates. Contrary to what we previously did when we illustrated Kaplan-Meier survival estimates, we can make some prediction in terms of career development inside the a2a Group. What emerges observing Cox model for the second, the fourth, and the sixth promotion inside the white collar pay grade, it is that the Asm company is the society where promotion are more luckily to happen. In fact, for all the models considered, this category holds a positive and highly significant hazard ratio, in that demonstrating the validity of this finding. Its effect does not diminish even when other covariates are introduced. In the second job change model, the "Energy" area of business rises the probability of being promoted, but without compromising the Asm society effect. Despite this particular case, it seems that the area of business does not exercises an incisive impact on employees' career. It is more the society of belonging that is determinant in this sense.

Moreover, as far as the highest promotion is concerned, we want to remind that the sixth promotion describes the situation in which one employee from the white collar pay grade completes all the career path until reaching the managerial position. In this respect, the only significant and negative effect is played by the fact of being woman.

We are not surprised by that. What does surprise us is the diametrically opposite scenario that we found inside the Executive pay grade level, above all from the society point of view, for which previously Asm showed a slightly positive hazard ratio only in Model 5. There, Asm had a positive hazard ratio, but less strong compared to the White Collar pay grade one. Moreover, in the Executive model the educational level was determinant in shaping the workers' careers, while here is not (with the exception of the "university" category in the second promotion model).

In this regards, we should outline that the Executive sample is much smaller than the White Collar pay grade one (370 observations against 983). This is in line with the company's composition in terms of workforce, and with its business characteristics. However, despite the dimensions of the sample, we found an higher number of non-significant coefficients in the White Collar model, than in the Executive one. Then, the

situation is puzzling and we may elaborate some better considerations once we will have depicted also the blue collar pay grade level promotion system.

Blue Collar pay grade

The last and the largest pay grade level is the "Blue Collar". As we know, the a2a Group is a company where the percentage of high skilled workers is low, and at the same time the average tenure is long. Data on the Blue Collar pay grade level allow us to depict a scenario of the human resource management system in place. Moreover, once defined the blue collar PG profiles of those people that got the number of promotions taken into consideration, we will be able to make some comparison with the White Collar pay grade level.

The higher number of promotions accorded to the Blue Collar PG workers is nine. However, the seventh, the sixth, and the ninth job changes are experimented only by few people (22, 3 and 1 respectively), then we won't consider them. For the others, we illustrate the survival curves exactly as we made for the White Collar PG.

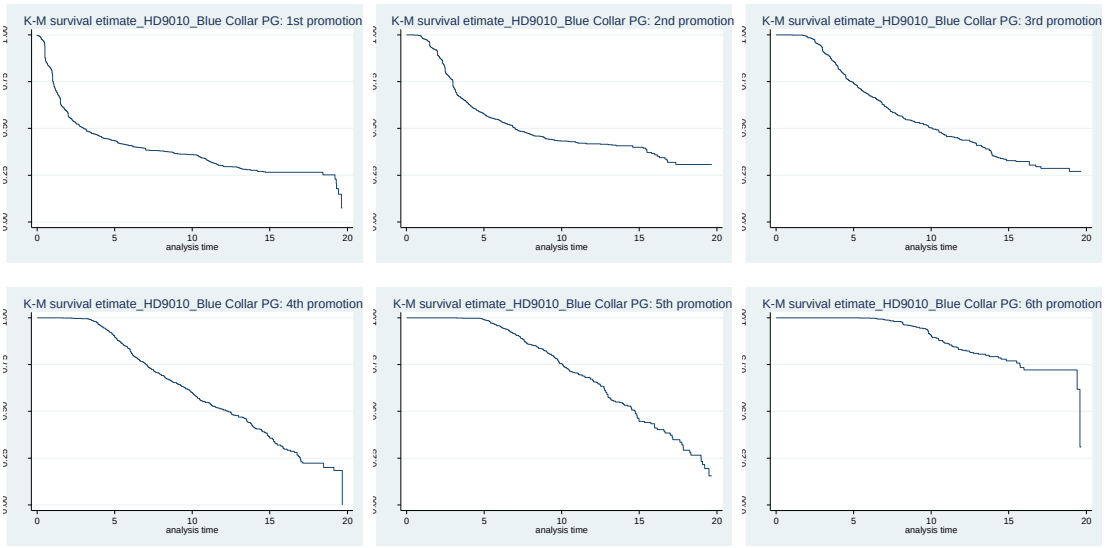


Fig. 3.29 a2a Group. Historical Dataset 1991-2010. Blue Collar pay grade level: 1st-6th promotion

First of all, we can group the above trends in three samples. For promotion 1 and 2 patterns are similar, as well as for promotion from 3 to 5, while the sixth has a different shape.

The pay grade levels that group the blue collar jobs are from the 14^{th} until the 10^{th}. The 9^{th} level is peculiar, in that it collects both specialized blue collar jobs, and some white collars functions. From the sixth level onwards instead, we are dealing with the category of white collar pay grade, until reaching the Executive in the fourth position. It follows that the first two graphs represent the beginning of blue collars' career, and in fact promotions occur with a probability of 50% after three and seven years respectively. The curves are skewed and placed in the lower part of the graph area, suggesting that the probability of experimenting the events is very high. The graph concerning the third change instead starts to assume a different shape. After some years where none of the workers are promoted, the line becomes inclined, and events occur very closed to each other. These concerns more specialized blue collar positions, and coherently the trend is even more defined as far as the fourth change in the pay grade level is concerned. Here, events occur starting from the fourth year, and the same 50% probability of experimenting the promotion is recorded after thirteen years. The sixth promotion represents a radical change, in that we consider it as the point in which there is a change from the Blue to the White collar pay grade system. This change does not occur for a lot of people, and in fact the survival curve of the sixth graph is almost plane, with a slowly decreasing trend. The highest probability of the occurrence of this event is equal to 25%, suggesting that this possibility is quite rare.

As for the White Collar position, it seems that there is a threshold that only a selected group of workers overcomes, and that defines who are the ones that complete their careers until reaching a white collar level.

It should be outlined that, differently for the White Collar PG, here there is an higher percentage of employees that get the job changes, suggesting that the promotions system is more inclusive as far as the Blue Collar PG is concerned.

Although the share of people interested in the job changes is higher than the other pay grade levels, from the Kaplan-Meier curves it emerges that a promotion system within the Blue Collar pay grade is possible and likely happens if one remains in the company for a sufficient number of years; different is the hypothesis for which after being hired in a Blue Collar PG, a worker experiments a number of promotions that allows him/her to be employed in a White Collar pay grade. "Barriers" among job categories seem to exist, and have an influence within the promotion system. This consideration is even strengthened if we consider that analyzing the number of promotions we assumed that one's career starts from the lowest job level (the fourteenth), but we know that this is not the unique option, in that a worker can also be hired in a higher position.

We did not take into consideration this hypothesis for several reasons. First of all, the average age at the hiring time is low, and it corresponds to the time where people finish their training at school. Secondly, the majority of manual jobs does not require a specific skill, and then we suppose that people are hired starting from the lower level of the placement system.

Given that, as we have just outlined, there seems to be a sort of threshold in correspondence to the third promotion, hence job changes we are going to analyze using the Cox model are:

- The second. It should occur for the workers that stay a relevant number of years inside the company, but it does not involve a "jump" toward the White Collar pay grade level. It can be conceived as the "regular" blue collars' career path;
- The fourth. Once overwhelmed the threshold of the three promotions, it collects people that changed their pay grade level toward the White Collar category;
- The sixth. It is the rare hypothesis for which a worker can reach an Executive PG position.

Following what we made in the White Collar PG, we run Cox model for the Blue Collars, with the aim of understanding the individual characteristics that can be considered relevant in order to complete the Blue Collar career path. In our comments,

we will take into account only those estimates that show significant coefficients, omitting the others.

First of all, also inside the Blue Collar pay grade category, being an Asm worker plays a positive impact on both the probability of being promoted two times (1.665***) and four times (1.738***). Estimates are closed to one, suggesting that career in Asm and Aem (the reference category) are characterized by similar trends. Among the other categories, "Other Energy & Gas" makes the probability of experimenting the second promotion more luckily to happen 1,7 times with respect to Aem (and this does not surprising, given that Kaplan-Meier curves already show positive trends for it); "Environment" instead, makes the fourth change in the pay grade system less luckily to occur 2,7 times *vs* Aem, and 14 times (with three-stars significance) for the sixth promotion. In general, these findings confirm what we stated when we described the career paths separately among the business areas – that is, Environment societies strongly and negatively affects the promotions of people, whereas Asm and Aem manifest similar trends; Other Energy & Gas is peculiar, with vertical career path, but characterized by a small sample, with a business area devoted mainly to services, and then not very representative of the main activities of the a2a Group.

Taking into consideration specifically the business area, the situation does not change a lot. Coefficients remain closed to the ones of Model 1, where only the society was included as independent variable. Still the "Environment" business area has a negative effect, but this time for the 2^{nd} and the 4^{th} promotion (1.6 and 5 times less probable respectively), capturing in this way the effect of the Environment societies, that previously was non-significant for these two job changes. Unexpectedly, among the areas of business "Heating & Services" manifests an hazard ratio of 3.7 higher that Networks.

The educational level shows a negative impact only for the "primary school" compared to "high school diploma", whereas unfortunately the other coefficients are non-significant. This does not give us additional information on the career plans, given that is was predictable that the lower the educational level, the lower the probability of

getting a promotion, although we may expect a positive effect of the university degree, especially for the sixth promotion.

Gender still holds a negative influence, as well as the seniority – where almost all the categories show hazard ratios included between zero and one, showing a negative impact with respect to the tenure 0-4.9 years. This finding is quite controversial, in that we should expect that the higher the number of promotions considered, the stronger the impact of the seniority.

3.3.3.4 Concluding remarks

In the last section of our study we adopted a micro perspective focused on the individual characteristics and their link with the probability of being promoted.

Approaching the issue from the pay grade level perspective, we can obtain more detailed predictions, in that the number of promotions accorded assumes a completely different value according to the hiring pay grade.

Interestingly, concerning the higher job levels – that is the Executive pay grades – we discovered that contrary to the general trends, different are the categories of variables that make the first job movement more likely to happen. Specifically, whereas on all the previous analyses the Asm society on average accorded promotions sooner, here are the "minor" societies that show positive and significant hazard ratios.

We believe that this finding can be explained in two ways. On one hand, these are the "new" societies, the ones that have been strengthened since the creation of the a2a Group as private company. We already pointed out this fact when we were dealing with the comparison between the pre and the post privatization phase (see for this par. 3.3.2.2). Hence, we can suppose that the Group is investing on these companies, retaining the best performers on the higher organizational levels and rewarding them with job promotions.

A second explanation instead is linked to the third covariate considered in the model of Tab 3.24, that is the educational level. It emerges that to have a primary

school or a vocational title plays a positive effect with respect of having a diploma. Given that we are dealing with Executive pay grade levels, we can suppose that it is their seniority to be rewarded. In hypothesis 5, we suggested that promotions might be accorded taking into consideration the length of service, and consequently the longer an individual would stay inside the organization, the higher the number of job movements experienced. Moreover, a long seniority can also be interpreted as expertise in the field of work, usually necessary when managerial positions are considered. This second scenario would also motivate the positive hazard ratio of the "Environment" category, of both the society and the business area, suggesting that the Executive pay grades are mainly covered by those people who stayed longer inside the Group, in that validating hypothesis 5.

However, this should not be interpreted in the sense that seniority coincides with promotions: conversely, the company can use the promotion system as instrument in order to retain the best performers. This hypothesis is confirmed observing the career paths of the White Collar pay grade level of Fig. 3.28, where we can see that after the third promotion the curve assumes a more skewed shape, suggesting that probably only those that overwhelm this step are considered valuable resources for the organization, and consequently promoted a higher number of times.

The scenario changes as far as the White Collar pay grade levels are concerned. The society that follows faster career paths is Asm, for which the hazard ratios are positive and highly significant in all the Cox models.

We should remember that concerning the White Collar levels, we analyzed three different job movements: the transition towards more specialized task (2 promotions), the Executive pay grade level (4 promotions), and the highest positions on the organizational chart (6 promotions).

Several are the categories of the considered covariates that positively influence these events. A prominent role seems to be played by Asm, but also by the "Other Energy & Gas" and "Other" societies. Even the educational level is important, rewarding the university degree over the diploma.

In general, with respect to the Executive pay grade, the White Collar one follows patterns of human resource management closer to the ones we described in the previous paragraphs, although a peculiar role is played by the new minor companies.

Blue Collar estimates on job movements confirm the tendencies shown by the White Collar pay grade. The methodology adopted is similar, and we focus on those promotions that allow employees to reach specialized positions within the pay grade (2 promotions), the White Collar pay grade (4 promotions), and the Executive one (6 promotions). Interestingly, it emerges that the transition from the Blue to the White Collar pay grade is a rare event. Despite this, as illustrated in Fig. 3.25 and 3.26, inside the a2a Group Blue Collars have best possibilities of being promoted with respect to White Collars. Their promotion system seems to be more dynamic, and this is not surprising given the nature of the Group, mainly devoted to technical jobs.

According to the Cox estimates, being employed in Asm and Other Energy & Gas still makes job movements more luckily to happen (II and IV promotion), while the "Environment" societies discourage the development of their employees.

Finally, the educational level does not have significant coefficients, as well as gender, then we cannot make assumptions on their effect.

Overall, we can develop some considerations on the role played by individual characteristics over the probability of job movements.

In the first part of our analyses we discovered that the society and the business area can have a positive impact, especially the categories "Asm", "Networks", and "Other Societies & Corporate"; while "Environment" on both the society and area of business perspective shows slower career paths.

According to hypothesis 2, we assumed that an internal labor market rewarding employees' expertise according to the area of business might to be at stake. Afterwards, when we focused on the historical development of the a2a Group human resource management system, we found that differences between the pre and the post

privatization phases exist – giving support to hypothesis 3, according to which the institutional context influences the internal labor market development.

Stated that since the transition toward the private market and the merger process the dynamics of workers' job movements have changed aligning the business area curves to a common trend, we moved our focus on a micro level – that is on the individual characteristics. At this purpose we estimated some models aimed at illustrating the ways in which the hiring pay grade is determinant on the development of the future workforce's career. Two different scenarios emerged: on one hand, Executive pay grades seem to be reached by people that accumulate expertise during the years, despite the company or the area of business. On the other hand, a completely different scenario is in place as far as the two major clusters are concerned – that is the White and Blue Collar pay grades. Here, as happened in the past, being part of the two societies that show the longest histories – Aem and Asm – facilitates job movements. Also the educational level is positively rewarded, whereas to be part of the Environment sector is disadvantageous.

Unfortunately, concerning hypothesis 5 on the importance of the seniority, we cannot develop grounded considerations, in that the estimates on this variable give us controversial results on the majority of the promotions considered.

Concluding, we can suggest that the institutional context plays a crucial role in the shaping process of the human resource system. According to the literature on the human resource planning, we cannot omit to consider both the supply and the demand analysis of what is needed by the company. Organizations are grounded in a socio-economic context that shapes the system of rules that companies have to adopt. In the case of the a2a Group, the transition towards the private market unequivocally rearranged the promotion system in place. Moreover, the hiring pay grade level has an influence as well. Being part of the Executive instead of White Collar pay grade depicts an almost opposite scenario in terms of human resource management policies. Additionally, despite the almost equal representation of White and Blue Collar pay grades, it is a rare event that an individual hired in a Blue Collar pay grade reaches a

White Collar position. In this regard, internal labor markets seem to follow their own logics of development more focused on the reference pay grade, instead of organizational variables as we previously supposed.

Conclusions

The aim of our research is to study the determinants that influence the workforce management inside the a2a Group.

In order to investigate this issue, in Chapter 1 we firstly illustrated the main approaches that the organizational studies literature has developed on the subject. In this regards, we decided to adopt an integrated approach, based on three streams of research: the internal labor markets, the organizational demography, and the human resource planning. The first theory, the internal labor markets, assumes that the ports of entry, mobility and wages are determined by internal systems of rules ascribable to several factors. According to Dunlop (1966), they refer to "all jobs in a firm", and the linked systems of promotion, hiring, transfer and turnover.

Doeringer and Piore instead (1971), shift the focus from administrative rules, toward skills specificity, on-the-job-training and customary law, which would be the responsible for the creation of internal promotion systems that protect employees from external candidates' competition. Seniority districts are in line with this perspective, in that it is the individual expertise that guarantees job movements within a firm.

In this respect, Fairris (2004) points out that these policies can be used also as instruments in order to retain the less skilled workers, in that the high skilled ones would be subjected to mechanisms of competition among companies – the presence of long job ladders, high pay growth systems, and the adoption of seniority as criterion of promotion, would guarantee the permanence of the less skilled component of the workforce.

An important characteristic of internal labor markets is their capacity of changing (Osterman 1984b). These systems are not static, but respond to changes that can affect the institutional context in which firms operate (Bernard & Smith 1991).

Moreover, during their lifecycles, companies eventually can modify their internal labor markets structure. According to Osterman (1984b), this can be due to several

causes: disturbance in product markets, shifting labor market conditions, and technological change, unionizations, or government regulations.

At this purpose, the second stream of research named "organizational demography" allowed us to develop a methodology aimed at studying job movements within our unit of investigation, that is the a2a Group workforce.

Referring to Konda and Stewman (1980) study on individual mobility inside companies, and conciliating this perspective with our third approach, the human resource planning, we tried to frame the organizational dynamics that governed and still govern the a2a Group human resource management system.

In this perspective, we first took into consideration the supply side of the human resource planning, that is the workforce demography and skills. Secondly, we shifted our focus on the demand analysis, and in particular on the career paths and organizational changes that interests the Group.

At this purpose, in Chapter 2, we developed five research hypothesis concerning the determinants that might influence the workforce management inside the company, and according to them, we run several statistical analyses using two different models: the Kaplan-Meier survival estimate, and the Cox proportional hazard model.

In the first part of the analyses we focused on the historical trends that characterized career paths inside the a2a Group, concentrating on the first promotion. We discovered that people experience the first job movement with a probability of 50% within 5 years of employment. Afterwards, we studied the same trend taking into consideration both the career paths inside each separate society, and the business areas.

Concerning the societies, we discovered that despite the formal differences (they all merged within the a2a Group during the '90s, but previously they run their own business), career paths are similar, with the only exception of the "a2a" category – the unique company that does not have a past as private utility.

This finding seems to neglect our first hypothesis, according to which patterns of career advancement should vary depending on the different formal organizations part of the a2a Group.

Considering the business area instead, we observed that promotions are still very close as far as the first four years of tenure are concerned, for changing afterwards. Additionally, the "Other Societies & Corporate" category shows a completely separate pattern of job movement, with promotions accorded sooner with respect to the other areas of business.

Following these analyses, we partially accepted the second hypothesis – that is patterns of career advancements are more affected by the nature of the business activities, than by specific formal organizations.

From this first overview on the job movements that interest the a2a Group workforce, clearly emerged that two specific categories – "a2a" and "Other Societies & Corporate" – show peculiar career paths. We explained the "Other Societies & Corporate" shape by referring to the characteristics of its workforce – that is, a high educational level, and their positioning within the upper job categories into the organizational chart.

Concerning the "a2a" trend instead, we could not omit to consider the peculiarity of its background, in that differently from the other categories of society, it has never been a public company.

This fact brought us to evaluate our third research hypothesis, enunciated as follows: "the change in governance from public to private company modified patterns of career advancements in the direction of isomorphism with other private companies".

In order to verify this statement, we divided the dataset in three categories according to the date of hiring, and next we plotted the related promotion trends.

Whereas the dataset concerning people hired between 1950-1970 did not give us a lot of information, because of some problems on the observations concerning the individuals' career, from the comparison between the cluster of people hired between 1971-1990s and 1991-2010s differences emerged.

Since the privatization and the merger process in the '90s, the first job movement has occurred sooner with respect to the past, with a probability of 50% after less than 3

years of tenure – while for those people hired during the decades 1971-1990, the same probability is experienced after 14 years of employment.

Given the magnitude of this time lag, we deepened the analyses disaggregating by society, and comparing the business area trends of the pre and post privatization phases.

Two considerations emerged.

First of all, not only the speed of promotions, but also the overall organizational structure of the different companies changed. Whereas in the past they operated mainly in the "Network", today the number of people employed in the other categories of business area increased. This is true especially for Aem, Asm, and Others.

In terms of human resource planning, this means that a new workforce management approach has been implemented, characterized by new career paths.

In relation to what we have just stated, and confirming the third hypothesis, it seems that the privatization process has originated an isomorphic tendency that moved career advancements of the a2a Group societies toward a logic more similar to the one of the private companies, with faster promotion career systems.

Concerning the single area of business inside formal societies instead, a change occurred as well. In fact, as far as the Asm and A2a categories are concerned, promotions by business area for people hired between 1991-2010 converged toward a common path, suggesting that the effect of the change in the governance structure is stronger on job movements with respect to the skill specificity – represented in our dataset by the specific area of business.

Once illustrated these preliminary findings, we decided to deepen the analyses of the a2a Group career system by concentrating on other promotions that can be accorded to workers.

Using Cox proportional hazard models, we estimated the impact that some relevant individual characteristics played on the occurrence of specific job movements.

In particular, we took into consideration variables concerning the society of hiring, the business area, gender, and seniority. Additionally, we decided to shift the analysis

to the third promotion because in this way we could develop a more complete picture of the promotion system in place inside the a2a Group.

In particular, from the variables considered, it emerged that there is not a single individual characteristic that strongly influences the occurrence of the third job movement. A positive impact is played by the fact of being an Asm worker – although the associated hazard ratio slightly higher than one indicates that a similar probability is experienced also by Aem workers.

At the same time, to be part of both the Environment societies and business area, negatively affect the promotions occurrence respectively of three times with respect to Aem, and 1.7 with respect to Networks.

Given that the mere information on the probability of the occurrence of a certain number of promotions can be incomplete, because it assumes a different meaning according to the hiring pay grade level from which the job movement happens, we developed a new dataset based on the hiring pay grades. According to them, we divided the observations in three samples, respectively: Executive, White Collar and Blue Collar pay grades.

Considering within each subsample a certain amount of promotions, we discovered that the probability of job movements is strongly influenced by the pay grade of belonging.

According to our findings, nowadays within Executive pay grades the seniority seems to be the more rewarded characteristic in order to get a promotion. Hazard ratios are in fact positive for people employed in the Environment societies, and with a primary school level of education. At the same time, the scenario is completely different as far as the White and Blue collars pay grades are concerned. Here, being a Aem, Asm or Other Energy & Gas worker plays a positive influence, confirming past trends delineated by Kaplan-Meier survival estimate models.

Nevertheless, it emerged that the transition from Blue to White Collar pay grades is a rare event, although job movements are more likely to happen within the Blue Collar pay grade, that in the White Collar one.

Separate considerations have also to be made concerning the “minor” categories of the society and business area, that is the “Other Energy & Gas”, “Others”, “Heating & Services” and “Other Societies & Corporate”. Despite the newness of some of them, and the restricted number of people here employed, they show positive hazard ratios for some of the job movements considered, suggesting that promotions happen more likely here that within the “traditional” categories. We interpreted this fact by referring to the integrated approach we adopted in the literature review, when we explained that both the institutional factors and the internal labor markets can change over time, modifying also organizational dynamics. In this respect, the transition toward the private sector has strongly affected the ways in which employees are managed inside the a2a Group, and whereas in the past skill specificity seemed to be the characteristic more rewarded when the company had a public ownership, today promotion trends are faster and closer to a common path similar to the one deployed by the “a2a” society.

At the same time, Cox proportional hazard models delineated a situation in which the a2a Group is investing more on these minor areas, considered strategic in the development of its business goals. In fact, among the declared strategic objectives for the time period 2013-2015, the company announced the acceleration of industrial growth, with investments focused on the most profitable and environmentally sustainable areas.

In particular: the treatment and waste-to-energy plants, the cogeneration systems and urban district heating, and the re-powering of generation plants. Additionally:

> “The management of human resources becomes more than a crucial issue in order to support the company’s present strategic objectives”.

It follows that our findings on the “Heating & Service” and “Environment” business areas can be related to the company’s will to invest in these specific segments of the market, and consequently, on the human resources here employed.

The aforementioned considerations are inspired by model of analysis that traces its origins back to the human resource planning approach, and in particular on the scheme we illustrated in Chapter 1.

Specifically, the present study focuses on the supply and demand analysis of the a2a Group workforce, with the identification of the existing gaps between the two.

Differently from what usually human resource planning programs entail, that is the elaboration of forecasts on succession and replacement policies, we did not deepen this area. At this purpose, we believe that this could be a future development for the present study, that primary focused on the analyses of the historical trends of the career advancements, expressing only some general considerations on the directions that the company seems to be walking through in terms of workforce management.

Despite this limit, we believe that the uniqueness of the data, together with the extraordinary processes of organizational changes that interested the company, makes an investigation focused on these trends valuable, especially in order to understand the differences that a change in the governance settings and in the institutional context can play on the human resource management system.

Moreover, we should outline that our findings might be partially biased by the lack of information concerning individuals hired in the decades 1950-1970s and 1971-1990s. These two clusters concern around the 47% of the total workforce – consequently, their incompleteness could have caused problems of low reliability in the estimates. Unfortunately, the absence of another case- study that allows for a comparison, makes the emergence of such potential deficiencies impossible.

Nevertheless, we should point out that, in order to avoid these restrictions, in the second part of our study we decided to focus exclusively on the subsample of people hired between 1991 and 2010s – that is the more complete cluster, in that obtaining more reliable estimates.

Concluding, we believe that the present study can contribute to the literature on organizational studies in two ways. Firstly, by focusing on an unexplored field: the Italian former public utilities human resource management. Secondly, by adopting a

new evidence-based approach able to develop advanced models of workforce planning analyses.

Appendix

A. Stratified Cox proportional hazard model by job category

A.1 First promotion

VARIABLES	(Model 1) _t	(Model 2) _t	(Model 3) _t	(Model 4) _t
SOCIETY (Aem ref.var.)				
Asm	1.144**	1.162***	1.160***	1.250***
	(0.0622)	(0.0637)	(0.0636)	(0.0765)
Others	1.279***	1.130	1.133	1.142
	(0.0930)	(0.0918)	(0.0918)	(0.0932)
Environment	1.166*	1.170*	1.166*	1.345***
	(0.0915)	(0.0988)	(0.0983)	(0.119)
A2a	1.596***	1.682***	1.701***	1.435***
	(0.135)	(0.149)	(0.151)	(0.129)
Other Energy & Gas	1.351***	1.429***	1.465***	1.369**
	(0.151)	(0.179)	(0.184)	(0.175)
missing	4.209***	4.407***	4.288***	3.156***
	(0.924)	(0.970)	(0.944)	(0.715)
BUSINESS AREA (Networks ref.var)				
Energy		0.931	0.902	0.848
		(0.0982)	(0.0957)	(0.0914)
Environment		1.043	1.049	0.862
		(0.0945)	(0.0949)	(0.0801)
Other Societies & Corporate		1.548***	1.522***	1.497***
		(0.141)	(0.138)	(0.141)
Heating & Services		0.872	0.901	0.825
		(0.122)	(0.126)	(0.115)
missing		1	1	1
		(0)	(0)	(0)
GENDER (Male ref.cat)				
Female			1.187***	1.177***
			(0.0735)	(0.0731)
SENIORITY (0 – 4.9 years ref.cat.)				
5.0 – 9.9 years				0.706***
				(0.0560)
10.0 – 19.9 years				0.526***
				(0.0393)
20.0 – 29.9 years				0.449
				(0.451)
missing				0.798***
				(0.0636)
Observations	**6,208**	**6,208**	**6,208**	**6,208**

seEform in parentheses
*** p<0.01, ** p<0.05, * p<0.1

A.2 Second promotion

VARIABLES	(Model 1) _t	(Model 2) _t	(Model 3) _t	(Model 4) _t
SOCIETY **(Aem ref.var.)**				
Asm	1.124*	1.130**	1.128*	1.099
	(0.0699)	(0.0706)	(0.0705)	(0.0767)
Others	0.856	0.998	0.997	0.987
	(0.0858)	(0.109)	(0.108)	(0.107)
Environment	0.635***	0.701***	0.699***	0.711***
	(0.0739)	(0.0845)	(0.0842)	(0.0886)
A2a	0.649***	0.684**	0.687**	0.651**
	(0.107)	(0.116)	(0.116)	(0.111)
Other Energy & Gas	0.907	0.972	0.982	0.906
	(0.151)	(0.172)	(0.174)	(0.161)
missing	0.839	0.814	0.787	0.565
	(0.841)	(0.816)	(0.789)	(0.568)
BUSINESS AREA **(Networks ref.var)**				
Energy		0.878	0.864	0.814
		(0.115)	(0.114)	(0.108)
Environment		0.644***	0.645***	0.585***
		(0.0917)	(0.0920)	(0.0844)
Other Societies & Corporate		0.750*	0.743*	0.728*
		(0.123)	(0.122)	(0.121)
Heating & Services		0.802	0.814	0.760
		(0.164)	(0.167)	(0.156)
missing		1	1	1
		(0)	(0)	(0)
GENDER **(Male ref.cat)**				
Female			1.082	1.071
			(0.0867)	(0.0861)
SENIORITY **(0 – 4.9 years ref.cat.)**				
5.0 – 9.9 years				0.641***
				(0.0753)
10.0 – 19.9 years				0.538***
				(0.0587)
20.0 – 29.9 years				0.543
				(0.547)
missing				0.585***
				(0.0718)
Observations	**6,208**	**6,208**	**6,208**	**6,208**

seEform in parentheses
*** p<0.01, ** p<0.05, * p<0.1

A.3 Third promotion

VARIABLES	(Model 1) _t	(Model 2) _t	(Model 3) _t	(Model 4) _t
SOCIETY (Aem ref.var.)				
Asm	1.242***	1.262***	1.264***	1.220***
	(0.0848)	(0.0867)	(0.0868)	(0.0934)
Others	0.684***	0.800	0.801	0.793*
	(0.0881)	(0.110)	(0.110)	(0.109)
Environment	0.336***	0.381***	0.381***	0.381***
	(0.0576)	(0.0669)	(0.0670)	(0.0683)
A2a	0.140***	0.152***	0.152***	0.151***
	(0.0631)	(0.0688)	(0.0686)	(0.0685)
Other Energy & Gas	1.051	1.044	1.039	0.962
	(0.209)	(0.216)	(0.215)	(0.200)
missing	2.816	2.791	2.856	1.949
	(2.828)	(2.804)	(2.873)	(1.967)
BUSINESS AREA (Networks ref.var)				
Energy		1.029	1.038	0.966
		(0.144)	(0.146)	(0.138)
Environment		0.585***	0.585***	0.542***
		(0.111)	(0.111)	(0.103)
Other Societies & Corporate		0.792	0.797	0.784
		(0.174)	(0.175)	(0.173)
Heating & Services		0.644	0.639	0.579*
		(0.181)	(0.180)	(0.163)
missing		1	1	1
		(0)	(0)	(0)
GENDER (Male ref.cat)				
Female			0.960	0.950
			(0.0890)	(0.0884)
SENIORITY (0 – 4.9 years ref.cat.)				
5.0 – 9.9 years				0.530***
				(0.0912)
10.0 – 19.9 years				0.409***
				(0.0670)
20.0 – 29.9 years				0.385
				(0.391)
missing				0.418***
				(0.0755)
Observations	**6,208**	**6,208**	**6,208**	**6,208**

seEform in parentheses

*** p<0.01, ** p<0.05, * p<0.1

A.4 Fourth promotion

VARIABLES	(Model 1) _t	(Model 2) _t	(Model 3) _t	(Model 4) _t
SOCIETY (Aem ref.var.)				
Asm	1.322***	1.356***	1.361***	1.347***
	(0.108)	(0.111)	(0.111)	(0.122)
Others	0.672**	0.894	0.900	0.894
	(0.109)	(0.151)	(0.152)	(0.152)
Environment	0.378***	0.481***	0.485***	0.482***
	(0.0712)	(0.0924)	(0.0932)	(0.0947)
A2a	0	0	0	0
	(0)	(0)	(1.00e-08)	(1.68e-08)
Other Energy & Gas	1.249	1.229	1.214	1.142
	(0.312)	(0.314)	(0.311)	(0.295)
missing	0	0	0	0
	(0)	(0)	(1.26e-07)	(1.45e-07)
BUSINESS AREA (Networks ref.var)				
Energy		1.081	1.111	1.029
		(0.177)	(0.184)	(0.173)
Environment		0.302***	0.300***	0.293***
		(0.0879)	(0.0873)	(0.0857)
Other Societies & Corporate		0.424**	0.435**	0.426**
		(0.154)	(0.158)	(0.155)
Heating & Services		0.480*	0.470**	0.430**
		(0.183)	(0.179)	(0.165)
missing		1	1	1
		(0)	(0)	(0)
GENDER (Male ref.cat)				
Female			0.878	0.873
			(0.0971)	(0.0969)
SENIORITY (0 – 4.9 years ref.cat.)				
5.0 – 9.9 years				0.692
				(0.251)
10.0 – 19.9 years				0.450**
				(0.161)
20.0 – 29.9 years				0
				(2.49e-07)
missing				0.456**
				(0.169)
Observations	**6,208**	**6,208**	**6,208**	**6,208**

seEform in parentheses

*** p<0.01, ** p<0.05, * p<0.1

A.5 Fifth promotion

VARIABLES	(Model 1) _t	(Model 2) _t	(Model 3) _t	(Model 4) _t
SOCIETY (Aem ref.var.)				
Asm	1.249**	1.301***	1.305***	1.227*
	(0.124)	(0.130)	(0.130)	(0.133)
Others	0.625**	0.868	0.874	0.830
	(0.130)	(0.184)	(0.185)	(0.177)
Environment	0.337***	0.524***	0.527***	0.498***
	(0.0805)	(0.126)	(0.127)	(0.122)
A2a	0	0	0	0
	(3.79e-10)	(2.28e-08)	(0)	(0)
Other Energy & Gas	0.882	0.816	0.809	0.739
	(0.339)	(0.317)	(0.314)	(0.289)
missing	0	0	0	0
	(0)	(7.29e-07)	(0)	(0)
BUSINESS AREA (Networks ref.var)				
Energy		1.403*	1.431*	1.305
		(0.259)	(0.267)	(0.248)
Environment		0.0338***	0.0336***	0.0348***
		(0.0340)	(0.0338)	(0.0350)
Other Societies & Corporate		0.261**	0.266**	0.254**
		(0.153)	(0.156)	(0.149)
Heating & Services		0.466*	0.460*	0.426*
		(0.210)	(0.207)	(0.193)
missing		1	1	1
		(0)	(0)	(0)
GENDER (Male ref.cat)				
Female			0.913	0.922
			(0.122)	(0.124)
SENIORITY (0 – 4.9 years ref.cat.)				
5.0 – 9.9 years				3.341e+07***
				(7.040e+06)
10.0 – 19.9 years				2.163e+07***
				(3.327e+06)
20.0 – 29.9 years				0
				(0)
missing				1.731e+07
				(0)
Observations	**6,208**	**6,208**	**6,208**	**6,208**

seEform in parentheses
*** p<0.01, ** p<0.05, * p<0.1

A.6 Sixth promotion

VARIABLES	(Model 1) _t	(Model 2) _t	(Model 3) _t	(Model 4) _t
SOCIETY **(Aem ref.var.)**				
Asm	1.370**	1.398**	1.404**	1.232
	(0.179)	(0.185)	(0.185)	(0.173)
Others	0.792	0.890	0.913	0.848
	(0.205)	(0.241)	(0.248)	(0.229)
Environment	0.381***	0.475**	0.479**	0.406***
	(0.115)	(0.155)	(0.157)	(0.136)
A2a	0	0	0	0
	(0)	(8.19e-09)	(0)	(0)
Other Energy & Gas	0.496	0.497	0.482	0.399
	(0.354)	(0.356)	(0.346)	(0.287)
missing	0	0	0	0
	(0)	(4.11e-07)	(0)	(0)
BUSINESS AREA **(Networks ref.var)**				
Energy		1.063	1.126	0.975
		(0.286)	(0.306)	(0.268)
Environment		0.581	0.567	0.610
		(0.216)	(0.212)	(0.229)
Other Societies & Corporate		0.747	0.792	0.724
		(0.348)	(0.371)	(0.340)
Heating & Services		1.267	1.208	1.060
		(0.433)	(0.414)	(0.364)
missing		1	1	1
		(0)	(0)	(0)
GENDER **(Male ref.cat)**				
Female			0.752	0.769
			(0.132)	(0.136)
SENIORITY **(0 – 4.9 years ref.cat.)**				
5.0 – 9.9 years				1.547e+08***
				(5.250e+07)
10.0 – 19.9 years				6.448e+07***
				(1.433e+07)
20.0 – 29.9 years				0
				(0)
missing				3.732e+07
				(0)
Observations	**6,208**	**6,208**	**6,208**	**6,208**

seEform in parentheses
*** p<0.01, ** p<0.05, * p<0.1

A.7 Seventh promotion

VARIABLES	(Model 1) _t	(Model 2) _t	(Model 3) _t	(Model 4) _t
SOCIETY **(Aem ref.var.)**				
Asm	1.057	1.068	1.068	0.902
	(0.192)	(0.196)	(0.196)	(0.174)
Others	0.883	1.070	1.116	0.994
	(0.286)	(0.365)	(0.383)	(0.341)
Environment	0.271***	0.466	0.473	0.384*
	(0.125)	(0.246)	(0.251)	(0.210)
A2a	0	0	0	0
	(0)	(0)	(0)	(0)
Other Energy & Gas	0	0	0	0
	(0)	(0)	(0)	(0)
missing	1	1	1.60e-05	0.00773
	(0)	(0)	(0)	(0)
BUSINESS AREA **(Networks ref.var)**				
Energy		0.917	0.963	0.831
		(0.330)	(0.348)	(0.303)
Environment		0.348	0.332	0.366
		(0.234)	(0.224)	(0.252)
Other Societies & Corporate		0.562	0.560	0.491
		(0.348)	(0.351)	(0.307)
Heating & Services		1.607	1.511	1.334
		(0.629)	(0.594)	(0.527)
missing		1	1	1
		(0)	(0)	(0)
GENDER **(Male ref.cat)**				
Female			0.737	0.780
			(0.167)	(0.178)
SENIORITY **(0 – 4.9 years ref.cat.)**				
5.0 – 9.9 years				6,156***
				(4,997)
10.0 – 19.9 years				3,597***
				(1,081)
20.0 – 29.9 years				0
				(0)
missing				1,759
				(0)
Observations	**6,208**	**6,208**	**6,208**	**6,208**

seEform in parentheses
*** p<0.01, ** p<0.05, * p<0.1

A.8 Eight promotion

VARIABLES	(Model 1) _t	(Model 2) _t	(Model 3) _t	(Model 4) _t
SOCIETY **(Aem ref.var.)**				
Asm	0.793	0.792	0.790	0.607
	(0.248)	(0.249)	(0.248)	(0.196)
Others	1.010	1.218	1.352	1.128
	(0.490)	(0.628)	(0.701)	(0.578)
Environment	0.242*	0.296	0.311	0.202
	(0.176)	(0.271)	(0.287)	(0.199)
A2a	0	0	0	0
	(0)	(0)	(0)	(0)
Other Energy & Gas	0	0	0	0
	(0)	(4.74e-10)	(0)	(0)
missing	1	1	0.00264	0.00882
	(0)	(0)	(0)	(0)
BUSINESS AREA **(Networks ref.var)**				
Energy		1.164	1.280	1.023
		(0.579)	(0.638)	(0.512)
Environment		0.736	0.661	0.863
		(0.674)	(0.610)	(0.843)
Other Societies & Corporate		0	0	0
		(2.71e-10)	(0)	(0)
Heating & Services		1.747	1.558	1.258
		(1.049)	(0.940)	(0.761)
missing		1	1	1
		(0)	(0)	(0)
GENDER **(Male ref.cat)**				
Female			0.530	0.579
			(0.212)	(0.235)
SENIORITY **(0 – 4.9 years ref.cat.)**				
5.0 – 9.9 years				393,631***
				(556,888)
10.0 – 19.9 years				82,042***
				(50,287)
20.0 – 29.9 years				0
				(0)
missing				19,515
				(0)
Observations	**6,208**	**6,208**	**6,208**	**6,208**

seEform in parentheses
*** p<0.01, ** p<0.05, * p<0.1

A.9 Ninth promotion

VARIABLES	(Model 1) _t	(Model 2) _t	(Model 3) _t	(Model 4) _t
SOCIETY (Aem ref.var.)				
Asm	0.827	0.796	0.799	0.632
	(0.380)	(0.366)	(0.367)	(0.295)
Others	0.920	1.680	1.821	1.474
	(0.699)	(1.331)	(1.448)	(1.171)
Environment	0.533	1.343	1.486	1.040
	(0.402)	(1.292)	(1.446)	(1.061)
A2a	0	0	0	0
	(0)	(0)	(0)	(0)
Other Energy & Gas	0	0	0	0
	(0)	(0)	(0)	(0)
missing	1	1	0.000123	0.0498
	(0)	(0)	(0)	(0)
BUSINESS AREA (Networks ref.var)				
Energy		0.406	0.437	0.356
		(0.428)	(0.461)	(0.376)
Environment		0.248	0.210	0.247
		(0.324)	(0.278)	(0.340)
Other Societies & Corporate		0	0	0
		(0)	(0)	(3.65e-10)
Heating & Services		5.441***	4.923***	4.135**
		(3.040)	(2.797)	(2.362)
missing		1	1	1
		(0)	(0)	(0)
GENDER (Male ref.cat)				
Female			0.628	0.711
			(0.357)	(0.408)
SENIORITY (0 – 4.9 years ref.cat.)				
5.0 – 9.9 years				0.000863
				(0)
10.0 – 19.9 years				3,663
				(0)
20.0 – 29.9 years				0
				(0)
missing				722.3***
				(754.9)
Observations	**6,208**	**6,208**	**6,208**	**6,208**

seEform in parentheses
*** p<0.01, ** p<0.05, * p<0.1

A.10 Tenth promotion

VARIABLES	(Model 1) _t	(Model 2) _t	(Model 3) _t	(Model 4) _t
SOCIETY				
(Aem ref.var.)				
Asm	0.267	0.258	0.255	0.197
	(0.286)	(0.281)	(0.277)	(0.218)
Others	0	0	0	0
	(0)	(0)	(0)	(0)
Environment	0.543	0.145	0.150	0.111
	(0.583)	(0.449)	(0.494)	(0.342)
A2a	0	0	0	0
	(0)	(0)	(0)	(0)
Other Energy & Gas	0	0	0	0
	(0)	(0)	(0)	(0)
missing	1	1	0.000120	0.136
	(0)	(0)	(0)	(0)
BUSINESS AREA				
(Networks ref.var)				
Energy		1.579	1.667	1.207
		(1.711)	(1.803)	(1.334)
Environment		4.581	3.927	4.418
		(14.13)	(12.86)	(13.51)
Other Societies & Corporate		0	0	0
		(0)	(0)	(0)
Heating & Services		0	0	0
		(0)	(0)	(0)
missing		1	1	1
		(0)	(0)	(0)
GENDER				
(Male ref.cat)				
Female			0.497	0.973
			(0.400)	(0.805)
SENIORITY				
(0 – 4.9 years ref.cat.)				
5.0 – 9.9 years				0.00321
				(0)
10.0 – 19.9 years				9,649***
				(10,714)
20.0 – 29.9 years				0
				(0)
missing				3,155
				(0)
Observations	**6,208**	**6,208**	**6,208**	**6,208**

seEform in parentheses
*** p<0.01, ** p<0.05, * p<0.1

A.11 Eleventh promotion

VARIABLES	(Model 1) _t	(Model 2) _t	(Model 3) _t	(Model 4) _t
SOCIETY (Aem ref.var.)				
Asm	0.722	0.720	0.719	0.555**
	(0.180)	(0.180)	(0.179)	(0.142)
Others	0.832	1.126	1.258	1.036
	(0.337)	(0.479)	(0.538)	(0.440)
Environment	0.355**	0.491	0.527	0.345
	(0.166)	(0.312)	(0.339)	(0.239)
A2a	0	0	0	0
	(0)	(1.80e-09)	(0)	(0)
Other Energy & Gas	0	0	0	0
	(0)	(1.01e-09)	(0)	(0)
missing	1	1	4.54e-05	0.136
	(0)	(0)	(0)	(0)
BUSINESS AREA (Networks ref.var)				
Energy		0.939	1.025	0.808
		(0.388)	(0.423)	(0.335)
Environment		0.635	0.550	0.702
		(0.445)	(0.391)	(0.534)
Other Societies & Corporate		0	0	0
		(5.64e-10)	(0)	(0)
Heating & Services		2.569**	2.285**	1.880
		(1.026)	(0.919)	(0.760)
missing		1	1	1
		(0)	(0)	(0)
GENDER (Male ref.cat)				
Female			0.541**	0.646
			(0.164)	(0.198)
SENIORITY (0 – 4.9 years ref.cat.)				
5.0 – 9.9 years				419,200
				(0)
10.0 – 19.9 years				88,603***
				(115,233)
20.0 – 29.9 years				0
				(0)
missing				20,931***
				(28,650)
Observations	**6,208**	**6,208**	**6,208**	**6,208**

seEform in parentheses
*** p<0.01, ** p<0.05, * p<0.1

B. Pay grade. Cox proportional hazard model

B.1 Executive PG. First promotion

VARIABLES	(Model 1) _t	(Model 2) _t	(Model 3) _t	(Model 4) _t	(Model 5) _t
SOCIETY (Aem ref.cat.)					
Asm	0.969	0.963	0.900	0.900	1.669*
	(0.217)	(0.216)	(0.203)	(0.203)	(0.444)
Others	2.770***	1.338	1.091	1.092	0.926
	(0.627)	(0.427)	(0.377)	(0.377)	(0.384)
Environment	3.101***	3.062***	2.033***	2.035***	3.845***
	(0.615)	(0.634)	(0.444)	(0.445)	(0.998)
A2a	3.079***	4.197***	4.104***	4.103***	3.397***
	(0.817)	(1.211)	(1.236)	(1.236)	(1.079)
Other Energy & Gas	2.125**	2.338**	2.269**	2.265**	2.330*
	(0.661)	(0.887)	(0.869)	(0.870)	(1.025)
missing	15.32***	16.26***	12.77***	12.74***	10.96***
	(11.22)	(11.93)	(9.460)	(9.447)	(8.639)
BUSINESS AREA (Networks ref.cat)					
Energy		0.893	1.061	1.064	0.970
		(0.274)	(0.330)	(0.332)	(0.345)
Environment		1.527	1.375	1.373	0.832
		(0.577)	(0.529)	(0.529)	(0.341)
Other Societies & Corporate		3.382***	2.675***	2.672***	2.125*
		(1.099)	(0.972)	(0.970)	(0.926)
Heating & Services		0.475**	0.437**	0.436**	0.226***
		(0.179)	(0.177)	(0.177)	(0.0979)
missing		1	1	1	1
		(0)	(0)	(0)	(0)
EDUCATIONAL LEVEL (High School Diploma ref.cat.)					
Primary School			2.836***	2.826***	3.678***
			(0.599)	(0.607)	(0.855)
Others & Vocational			3.599***	3.585***	4.696***
			(0.961)	(0.969)	(1.326)
University Degree			0.789	0.791	0.730*
			(0.147)	(0.149)	(0.140)
GENDER (Male ref.cat)					
Female				0.982	0.776
				(0.197)	(0.160)
SENIORITY (0 – 4.9 years ref.cat.)					
5.0 – 9.9 years					0.812
					(0.230)
10.0 – 19.9 years					0.287***
					(0.0844)
20.0 – 29.9 years					0
					(0)
missing					1.838**
					(0.519)
Observations	**502**	**502**	**502**	**502**	**502**

seEform in parentheses
*** p<0.01, ** p<0.05, * p<0.1

B.2 White Collar PG. Second promotion

VARIABLES	(Model 1) _t	(Model 2) _t	(Model 3) _t	(Model 4) _t	(Model 5) _t
SOCIETY **(Aem ref.cat.)**					
Asm	1.972***	1.962***	1.531**	1.533**	2.022***
	(0.340)	(0.340)	(0.273)	(0.273)	(0.444)
Others	2.064***	1.931***	1.843***	1.846***	1.890**
	(0.470)	(0.460)	(0.436)	(0.437)	(0.473)
Environment	1.466	1.351	1.345	1.348	1.789*
	(0.404)	(0.407)	(0.400)	(0.403)	(0.571)
A2a	0.892	0.834	0.840	0.840	0.590
	(0.529)	(0.515)	(0.517)	(0.517)	(0.364)
Other Energy & Gas	2.057**	2.064*	2.040*	2.034*	1.831
	(0.707)	(0.767)	(0.758)	(0.758)	(0.724)
missing	0	0	0	0	0
	(0)	(0)	(8.22e-05)	(1.50e-06)	(0)
BUSINESS AREA **(Networks ref.cat)**					
Energy		0.979	0.830	0.833	0.773
		(0.276)	(0.233)	(0.235)	(0.228)
Environment		1.283	1.172	1.171	0.965
		(0.372)	(0.332)	(0.332)	(0.270)
Other Societies & Corporate		1.294	1.089	1.090	1.089
		(0.462)	(0.389)	(0.390)	(0.404)
Heating & Services		1.250	1.499	1.493	1.126
		(0.542)	(0.646)	(0.646)	(0.492)
missing		1	1	1	1
		(0)	(0)	(0)	(0)
EDUCATIONAL LEVEL **(High School Diploma ref.cat.)**					
Primary School			1.450	1.446	1.340
			(0.343)	(0.343)	(0.321)
Others & Vocational			0.380*	0.379*	0.450
			(0.194)	(0.194)	(0.230)
University Degree			4.524***	4.535***	3.004***
			(0.735)	(0.742)	(0.542)
missing					
GENDER **(Male ref.cat)**					
Female				0.981	0.865
				(0.162)	(0.143)
SENIORITY **(0 – 4.9 years ref.cat.)**					
5.0 – 9.9 years					0.657*
					(0.164)
10.0 – 19.9 years					0.178***
					(0.0486)
20.0 – 29.9 years					0
					(0)
missing					0.618
					(0.186)
Observations	**1,652**	**1,652**	**1,652**	**1,652**	**1,652**

seEform in parentheses
*** p<0.01, ** p<0.05, * p<0.1

B.3 White Collar PG. Fourth promotion

VARIABLES	(Model 1) _t	(Model 2) _t	(Model 3) _t	(Model 4) _t	(Model 5) _t
SOCIETY **(Aem ref.cat.)**					
Asm	1.253	1.295	1.328*	1.328*	1.925***
	(0.210)	(0.219)	(0.227)	(0.227)	(0.393)
Others	1.095	1.131	1.141	1.156	1.372
	(0.286)	(0.302)	(0.305)	(0.311)	(0.386)
Environment	0.772	1.006	1.092	1.098	1.594
	(0.231)	(0.329)	(0.360)	(0.362)	(0.549)
A2a	0	0	0	0	0
	(0)	(0)	(0)	(0)	(1.88e-10)
Other Energy & Gas	3.566***	3.052***	3.235***	3.208***	3.093***
	(1.041)	(0.940)	(0.996)	(0.991)	(1.027)
missing	1	1	0.0498	0.368	0.00498
	(0)	(0)	(0)	(0)	(0)
BUSINESS AREA **(Networks ref.cat)**					
Energy		1.722**	1.561**	1.589**	1.678**
		(0.385)	(0.347)	(0.360)	(0.398)
Environment		0.547	0.502	0.496*	0.420**
		(0.231)	(0.212)	(0.211)	(0.175)
Other Societies & Corporate		0.332	0.293*	0.296*	0.323
		(0.238)	(0.210)	(0.212)	(0.233)
Heating & Services		1.238	1.280	1.260	1.511
		(0.519)	(0.538)	(0.531)	(0.645)
missing		1	1	1	1
		(0)	(0)	(0)	(0)
EDUCATIONAL LEVEL **(High School Diploma ref.cat.)**					
Primary School			0.267***	0.264***	0.243***
			(0.112)	(0.111)	(0.102)
Others & Vocational			0.422**	0.418**	0.484**
			(0.154)	(0.153)	(0.178)
University Degree			1.097	1.105	0.910
			(0.278)	(0.280)	(0.242)
missing					
GENDER **(Male ref.cat)**					
Female				0.928	0.892
				(0.164)	(0.157)
SENIORITY **(0 – 4.9 years ref.cat.)**					
5.0 – 9.9 years					0.747
					(0.480)
10.0 – 19.9 years					0.243**
					(0.155)
20.0 – 29.9 years					0
					(0)
missing					0.677
					(0.445)
Observations	**1,652**	**1,652**	**1,652**	**1,652**	**1,652**

seEform in parentheses
*** p<0.01, ** p<0.05, * p<0.1

B.4 White Collar PG. Sixth promotion

VARIABLES	(Model 1) _t	(Model 2) _t	(Model 3) _t	(Model 4) _t	(Model 5) _t
SOCIETY (Aem ref.cat.)					
Asm	2.569***	2.569***	2.523***	2.518***	2.358***
	(0.451)	(0.459)	(0.456)	(0.455)	(0.466)
Others	1.500	1.604	1.593	1.768*	1.683
	(0.451)	(0.498)	(0.495)	(0.556)	(0.535)
Environment	0.790	1.062	1.047	1.058	0.975
	(0.271)	(0.421)	(0.418)	(0.424)	(0.400)
A2a	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)
Other Energy & Gas	0.601	0.597	0.586	0.561	0.494
	(0.607)	(0.604)	(0.595)	(0.570)	(0.503)
missing	1	1	0.000116	0.000912	1
	(0)	(0)	(0)	(0)	(0)
BUSINESS AREA (Networks ref.cat)					
Energy		0.914	0.925	1.067	1.012
		(0.312)	(0.318)	(0.372)	(0.355)
Environment		0.538	0.545	0.511	0.510
		(0.227)	(0.230)	(0.217)	(0.217)
Other Societies & Corporate		0.840	0.855	0.941	0.902
		(0.497)	(0.506)	(0.558)	(0.538)
Heating & Services		0.410	0.414	0.378	0.357
		(0.293)	(0.296)	(0.270)	(0.256)
missing		1	1	1	1
		(0)	(0)	(0)	(0)
EDUCATIONAL LEVEL (High School Diploma ref.cat.)					
Primary School			1.163	1.069	1.081
			(0.286)	(0.265)	(0.268)
Others & Vocational			1.097	1.048	1.047
			(0.297)	(0.285)	(0.285)
University Degree			1.134	1.158	1.073
			(0.361)	(0.369)	(0.347)
missing					
GENDER (Male ref.cat)					
Female				0.567**	0.575**
				(0.131)	(0.133)
SENIORITY (0 – 4.9 years ref.cat.)					
5.0 – 9.9 years					3.812e+06***
					(2.135e+06)
10.0 – 19.9 years					1.459e+06***
					(434,401)
20.0 – 29.9 years					1
					(0)
missing					1.150e+06
					(0)
Observations	**1,652**	**1,652**	**1,652**	**1,652**	**1,652**

seEform in parentheses
*** p<0.01, ** p<0.05, * p<0.1

B.5 Blue Collar PG. Second promotion

VARIABLES	(Model 1) _t	(Model 2) _t	(Model 3) _t	(Model 4) _t	(Model 5) _t
SOCIETY **(Aem ref.cat.)**					
Asm	1.665***	1.662***	1.675***	1.679***	1.794***
	(0.126)	(0.127)	(0.128)	(0.129)	(0.156)
Others	1.144	1.422***	1.429***	1.432***	1.454***
	(0.141)	(0.191)	(0.192)	(0.192)	(0.197)
Environment	0.901	1.000	1.047	1.046	1.196
	(0.130)	(0.149)	(0.158)	(0.158)	(0.188)
A2a	1.070	1.103	1.148	1.142	0.957
	(0.201)	(0.210)	(0.219)	(0.219)	(0.186)
Other Energy & Gas	1.761***	1.831***	1.816***	1.807***	1.635**
	(0.374)	(0.407)	(0.406)	(0.404)	(0.371)
missing	0.887	0.858	0.824	0.856	0.627
	(0.889)	(0.860)	(0.826)	(0.860)	(0.632)
BUSINESS AREA **(Networks ref.cat)**					
Energy		0.910	0.874	0.901	0.852
		(0.148)	(0.144)	(0.154)	(0.150)
Environment		0.603***	0.643***	0.641***	0.536***
		(0.102)	(0.110)	(0.109)	(0.0935)
Other Societies & Corporate		0.624**	0.601**	0.613**	0.613**
		(0.128)	(0.123)	(0.127)	(0.129)
Heating & Services		0.775	0.766	0.764	0.722
		(0.212)	(0.210)	(0.209)	(0.197)
missing		1	1	1	1
		(0)	(0)	(0)	(0)
EDUCATIONAL LEVEL **(High School Diploma ref.cat.)**					
Primary School			0.827**	0.820**	0.821**
			(0.0691)	(0.0693)	(0.0696)
Others & Vocational			0.924	0.917	0.944
			(0.0972)	(0.0970)	(0.100)
University Degree			1.148	1.163	1.055
			(0.213)	(0.217)	(0.198)
missing					
GENDER **(Male ref.cat)**					
Female				0.944	0.946
				(0.0885)	(0.0890)
SENIORITY **(0 – 4.9 years ref.cat.)**					
5.0 – 9.9 years					0.618***
					(0.0879)
10.0 – 19.9 years					0.519***
					(0.0675)
20.0 – 29.9 years					0.727**
					(0.108)
missing					
Observations	**3,856**	**3,856**	**3,856**	**3,856**	**3,856**

seEform in parentheses
*** p<0.01, ** p<0.05, * p<0.1

B.6 Blue Collar PG. Fourth promotion

VARIABLES	(Model 1) _t	(Model 2) _t	(Model 3) _t	(Model 4) _t	(Model 5) _t
SOCIETY (Aem ref.cat.)					
Asm	1.738***	1.757***	1.818***	1.908***	1.757***
	(0.167)	(0.169)	(0.177)	(0.190)	(0.187)
Others	0.628**	1.035	1.051	1.075	0.997
	(0.144)	(0.249)	(0.252)	(0.259)	(0.240)
Environment	0.361***	0.462***	0.520**	0.529**	0.510**
	(0.0908)	(0.117)	(0.134)	(0.136)	(0.134)
A2a	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)
Other Energy & Gas	0.550	0.587	0.561	0.570	0.482
	(0.391)	(0.418)	(0.401)	(0.407)	(0.345)
missing	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)
BUSINESS AREA (Networks ref.cat)					
Energy		0.659	0.628*	0.745	0.649
		(0.181)	(0.172)	(0.211)	(0.185)
Environment		0.197***	0.212***	0.206***	0.216***
		(0.0838)	(0.0899)	(0.0873)	(0.0917)
Other Societies & Corporate		0.464*	0.436*	0.504	0.480
		(0.215)	(0.202)	(0.236)	(0.225)
Heating & Services		0.122**	0.116**	0.116**	0.100**
		(0.122)	(0.117)	(0.116)	(0.100)
missing		1	1	1	1
		(0)	(0)	(0)	(0)
EDUCATIONAL LEVEL (High School Diploma ref.cat.)					
Primary School			0.704***	0.675***	0.675***
			(0.0814)	(0.0788)	(0.0789)
Others & Vocational			0.977	0.930	0.925
			(0.132)	(0.127)	(0.126)
University Degree			1.133	1.203	1.147
			(0.334)	(0.356)	(0.340)
missing					
GENDER (Male ref.cat)					
Female				0.715**	0.711**
				(0.101)	(0.101)
SENIORITY (0 – 4.9 years ref.cat.)					
5.0 – 9.9 years					0.707
					(0.338)
10.0 – 19.9 years					0.447*
					(0.210)
20.0 – 29.9 years					0.345**
					(0.170)
missing					
Observations	**3,856**	**3,856**	**3,856**	**3,856**	**3,856**

seEform in parentheses
*** p<0.01, ** p<0.05, * p<0.1

B.7 Blue Collar PG. Sixth promotion

VARIABLES	(Model 1) _t	(Model 2) _t	(Model 3) _t	(Model 4) _t	(Model 5) _t
SOCIETY **(Aem ref.cat.)**					
Asm	0.672	0.741	0.857	0.757	0.638
	(0.172)	(0.192)	(0.225)	(0.209)	(0.183)
Others	0.365*	0.447	0.447	0.445	0.405
	(0.216)	(0.283)	(0.280)	(0.277)	(0.252)
Environment	0.0704***	0.0945**	0.132**	0.127**	0.112**
	(0.0709)	(0.0963)	(0.136)	(0.131)	(0.116)
A2a	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)
Other Energy & Gas	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)
missing	1	1	0.0181	1.67e-05	2.26e-06
	(0)	(0)	(0)	(0)	(0)
BUSINESS AREA **(Networks ref.cat)**					
Energy		1.517	1.467	1.157	0.996
		(0.709)	(0.686)	(0.572)	(0.500)
Environment		0.359	0.422	0.457	0.540
		(0.377)	(0.443)	(0.482)	(0.569)
Other Societies & Corporate		0.566	0.484	0.373	0.324
		(0.593)	(0.503)	(0.389)	(0.342)
Heating & Services		3.767***	3.666***	3.706***	2.948**
		(1.628)	(1.593)	(1.609)	(1.292)
missing		1	1	1	1
		(0)	(0)	(0)	(0)
EDUCATIONAL LEVEL **(High School Diploma ref.cat.)**					
Primary School			0.460***	0.488**	0.474**
			(0.139)	(0.148)	(0.144)
Others & Vocational			0.446**	0.478*	0.463*
			(0.178)	(0.193)	(0.187)
University Degree			0.418	0.393	0.363
			(0.422)	(0.397)	(0.368)
missing					
GENDER **(Male ref.cat)**					
Female				1.572	1.530
				(0.463)	(0.466)
SENIORITY **(0 – 4.9 years ref.cat.)**					
5.0 – 9.9 years					0.488
					(0.256)
10.0 – 19.9 years					0.198***
					(0.0728)
20.0 – 29.9 years					0.0992
					(0)
missing					
Observations	**3,856**	**3,856**	**3,856**	**3,856**	**3,856**

seEform in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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