The Transformation of work in European banks: An analysis of IT skills

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Abstract

Researches that have recently investigated the impact of developments in Information Technologies (IT) on human capital in the banking industry analysed only marginally the evolution of IT skills inside the organization or, when they did it properly, they limited the analysis only on specialized IT skills.

Given the criticality of skills shortage stemming by higher investments in IT systems, the present article combines case studies and a survey on a sample of European banks in order to investigate the allocation of non specialized IT competencies of banks, their trend and connection with organizational changes. The study confirms that the new organizational models, based on the overcoming of the traditional bureaucratic organizational forms, are correlated with an overall upskilling concerning IT competencies.

The results obtained about the growth of IT skills imply a "substitution" phenomenon between *competencies about the working tools (Information Technology) and competencies about the technical content of the job (financial knowledge, risk evaluation capabilities). While the needs for the former ones increase, the demand for the latter ones remains stable or decreases, thanks to the high product standardization and because of the capability of IT of codifying in software market and technical knowledge.*

Keywords

Organizational change, Information Technology, IT skills

1. Introduction

The banking sector is one of the industries where the evolution of traditional employment practices and the transformation of work have recently been the object of intense debate. Innovation in Information Technology (IT), deregulation policies and changes on the demand side of the market are described as the main drivers of the deep organisational changes that have been taking place during the last 20 years in this sector.

In the past few years, in considering in banks the evolution of organizational structures, this debate has emphasized the skill shortage that several banks are recently facing as a result of the evolution of competencies that is complementar to the transformation of the traditional bureaucratic models. IT competencies - either specialized or non specialized - are described as an area where this skill shortage is particular critical because of the high amount of IT investments carried out by banks in the past years and because of the pervasive impact of these technologies on workpractices.

Given the relevance of this issue, the current article through a survey on a sample of 70 of the main 230 banks in the EU countries is focused on better understanding how the presence and the effective allocation of IT skills is changing in banks, considering the industry's tendencies to increase investment in IT systems. Furthermore, in investigating the evolution of IT skills, the article intends to analyse the links between these transformations and the organizational changes at the level of the macrostructure.

Even though the transition of banks to new organizational models involves change in the demand of different kinds of competencies (not only IT skills, but also investment analysis skills, risk management capabilities, etc.), the willingness to focus the analysis only on IT skills instead of on specific technical skills stems from the importance of IT competencies as a tool for sharing information and knowledge inside the organization.

The article is divided into four parts:

- section 2 summarises the contributions found in literature on the evolution of roles and skills in banks, relating this evolution with developments in IT systems;
- section 3 summarizes the results of case studies done in some banks for investigating the organizational change and its effects on the transformation of the required skills;
- section 4 reports the results of the analysis on the evolution of IT skills;
- the conclusions discuss the obtained results.

2. Technological innovation, organizational change and the demand for skills in banks

Contributions that examine organizational change inside banks develop by some traditional studies that since the 1950s have analysed the IT effects on organization design considering consequences on macrostructure and on roles. These studies point out both delayering phenomena (favoured by the simplification of communication and control processes) and the consequential tasks rethinking for middle management (e.g. Leavitt &Whisler 1958).

The analysis of these contributions shows how the effects of IT on the organization are complex and that, since they do not just lead to the automation of the most routine activities, they do not necessarily consist in a mere replacement of labour with technical capital (e.g. Zuboff, 1988). Since the current article focuses on the effects of IT on the human capital, studies that investigates (both in banks and on a larger analytical domain) the effect of innovation in IT on the evolution of roles and on decision-making processes give an important contribution.

Hunter and Lafkas (1998) describe in banks the effect of IT on tasks and on employees as made of three different components:

1. the automation of routine tasks (as most of the control activities),
2. richer informative flows towards employees in sales activities,
3. the higher decision making power for line workers due to richer information flows towards them.

Even though the last two effects lead us to hypothesize a general empowerment of front office employees as one of the consequence of higher investments in IT, the effects on the organization of work due to the introduction in banks of new IT systems has not always been described in the years as univocal. The debate has often been about the effects on decision making and control processes. More in detail, the transformation of banks from full bureaucracies (Mintzberg 1979) where the work was mainly organized around paper flows to organizations where information technology dictates the division of work has opened a controversial issue about the overall impact of technology. Does IT lead in these companies to a "reproposition" of tayloristic settings in a context that is different from that one of the factory? Or, differently, are banks evolving towards flatter structures where employees have higher skills, their roles are less specialized and richer of technical contents?

Results are contradictory. For instance, in two different insurance companies (where internal processes have, as in banks, an information intensive nature) Appelbaum and Albin (1989) find evidences both of a "tayloristic" and of a "post fordistic" approach. The two authors explain the different outcomes through a contingent view of the managerial decisions (affected by the stability of the external environment and by the availability of skills in the company) about how to employ IT systems.

More recent contributions, pointing out that the increased customer orientation and the exploitation of new IT capabilities led to the creation of new roles and to the progressive extinction of some traditional ones, agree on the evolution of banks towards "post fordist organizations" (e.g. Regini, Kitay and Baethge 1999; Keltner & Finegold, 1997).

In emphasizing the decreased specialization of roles in banks, these contributions often refer to front office activities.

Few studies (e.g. Autor, Levy and Murnane 2000) focused, instead, on the evolution of roles in back office functions, where the capability of IT of automating the major aspects of the supervision of work has radically changed the allocation of power (Scott Morton 1991).

In describing these restructuring processes, several contributions (e.g. Piore & Sabel, 1984; Brynjolfsson, Bresnhan and Hitt 2000, Caroli & Van Reenen, 2001) focus on the demand for more skilled human capital as a complementary factor to the organizational change favoured by IT. This thesis contrasts with some studies of the 1970s and the 1980s that, on the basis of the empirical evidence of the early generations of mainframe computers, postulate that the overall effect of IT systems has been a "taylorization" of work and the deskilling of clerical work (e.g. Glenn & Feldberg 1977).

All of these studies emphasize the fact that in the current scenario (where IT systems are easily available and not too costly for banks) the critical factors for successfull changes in internal processes are:

1. the availability of human resources with a good knowledge and understanding of IT;
2. managerial practices implemented to adapt the social system to the technological change (see Scott Morton 1991).

What makes such factors so critical is the time lag required for aligning the human capital to the existing technology (concerning its training level, its assimilation of new work practices), beyond a lack of some specific skills on the outside labour market.

Prasad and Harker (1997), who conduct an analysis on a sample of US retail banks, confirm the criticality of investment on human capital. The two authors point out that additional investments in labour specialized in the maintenance of IT applications increase productivity. However, some of these studies (e.g. Brynjolfsson & Hitt 1996), focus only on the presence of specialized IT skills and neglect the measurement of IT competencies in employees who do not belong to the Information Systems (IS) department.

Because of the persavise impact of IT on the organization workpractice, we believe that the availability of non-IS department employees with a good knowledge of IT is more critical than the presence of specialized IT skills shortage. Usually needs about the latter kind of competencies manifest themselves on a less wide set of employees. The features of such needs, therefore, make less difficult to acquire scarce resources (this acquisition can be managed through an outsourcing or by hiring expert workers). For their intrinsic characteristics, non specialized IT competencies needs can be filled mainly through the internal labour market or through hiring workers who have just finished their educational path.

Given the higher criticality about “non-specialized” IT competencies, the current article intends to measure the presence and the allocation of such competencies in banks. One of the limitations of this choice is that the we cannot argue if the overall trend of IT skills in the analysed organizations coexists with deskilling phenomena for some specific jobs, given our choice of a “broader” unit of analysis.

3. The organizational change inside banks: some evidences from case studies

The analysis of the organizational context in which the effects of IT on skills were studied was conducted through 6 explorative case studies on some European banks.

Location	**1.000 - 5.000 employees**	**> 5.000 employees**
Italian banks	2	1
European banks	1	2

Table 1. A breakdown of the sample for case studies

Several factors pointed out by case studies give evidence of a general process of restructuring begun in the 1990s and strictly connected with investments in new IT systems.

1. the automation of several administrative procedures – allowing the progressive dematerialization of communication and control processes (less and less based on paper based flows) – has favoured the centralization of back office activities traditionally performed in local branches
2. On the other hand, the product standardization and the codification of technical and market knowledge (about evaluation of customer risk, of his potential profitability and needs) in software, conjointly with the capability of IT of giving real time access to all sales channels to information about customer and products, has allowed the expansion of front office areas and their unbundling by the "technical core" of banks, where the knowledge for risk management and for new product development has been concentrated.
3. In back office functions the job content has been going through a redefinition, with the progressive reduction of administrative tasks in favour of management capabilities.
4. In front office areas, the importance of commercial capabilities is increasing. These skills are made up of the following elements: knowledge of banking products' features, capability to identify customers financial needs, and capability to offer customers a portfolio of products that can maximize the lifetime value for the bank.

In this context, the need for IT skills is constantly increasing: Human Resource managers agreed that the evolution of IT skills inside banks seems to evolve towards a restricted need for high specialized IT knowledge (correlated with IT systems maintenance process). This need is combined with a high demand for "intermediate" IT skills (consisting in the knowledge of the main software package and of Internet browsers) that help employees in using the technologies for performing the "traditional" tasks in new ways. However, because of the time lags in aligning the human capital to the technical capital (this depends partially on the effectiveness of the adopted managerial policies) is still not clear how fast IT skills are changing and whether a critical skill shortage about this kind of competencies currently exists.

Furthermore, the banks' level of IT skills should not be considered as dependant simply on their technology, but also on other factors such as:

- the adopted organizational model, which affects the way IT systems are implemented; how top management decided to use IT to redesign decision making processes and the related information flows affects the number of employees who are required to have non elementary IT capabilities;
- the country: the features of the national educational and vocational training systems affect the cost sustained by banks to have an adequately trained workforce; furthermore, the local collective bargaining systems allow banks to manage training activities and the growth path of human resources in the acquisition of IT skills in rather different ways. For instance, case studies point out that IT literacy is not a necessary condition for recruiting in the United Kingdom; the management can arrange with each employee separate training paths for IT skills; such a system, which is disputed by Trade Unions, allows to concentrate investments just on a share of employees, leaving the other subset just with a basic training level. Furthermore, the degree of competition of the local markets varies substantially across Europe. This affects the pressures on organizational changes and, consequently, the skills evolution in banks.

- the managerial policies: the growth path in the acquisition of new skills reflects – beyond a consistency with the corporate strategy – the policies adopted by the management for dealing with the risk of an employee's quitting.

Therefore, on the basis of such findings and taking also in account most of the recent contributions about the impact of IT investments on skills, it is worthwhile to verify on a wider statistical basis:

1. how the allocation of IT skills is changing inside banks,
2. if correlations between changes in IT skills and organizational change at the macro level exist.

A survey accomplished in 2001 for of an European project about IT employability issues in the European banking industry[1] has offered the opportunity to investigate these themes on a sample composed by the main European banks.

4. The evolution of IT skills: evidence from a survey in the European banking industry

4.1 The empirical analysis: objectives and methodology

Considering the empirical evidence about restructuring processes currently in place in the banking industry, the survey accomplished in 2001 represented the methodological tool used to investigate the effect of the massive IT deployment on workers' skills.

A questionnaire was sent to the Human Resources executives of a sample composed of the main (in terms of assets) 230 retail banks in the European Union and in Switzerland with more than 250 employees. The questionnaire mainly investigated the distribution of the labour force by macro functions and by IT skills and some aspects about training strategies.

To measure the allocation of IT competencies in banks and their trends between 1998 and 2000, the distribution of the labour force in the main area of banks has been analysed according to a classification of IT skills. This scale (presented in table 2) has been defined on the basis of the cognitive capabilities underlying to each skills level. It excludes specialized IT competencies and includes four levels of Information Technology capabilities.

Level 0 and level 1 imply elementary IT competencies that allow employees carrying out a limited set of activities (such as data entry activities in front office or routinized control tasks in the back office). Most of these activities are accomplished using traditional terminals istead of on-line PCs. Level 2 ("intermediate" knowledge) refers to capabilities that in the banking business can mostly be applied to sales activities or, in back office department, into reengineered control procedures (e.g. document and workflow management applications). This level can be identified with a good knowledge of Internet browsers and of the main software packages for the office automation. Different than the two lower levels, level 2 IT skills allow employees who have such an understanding to exploit their capabilities for

[1] The UNI-Europa Finance on behalf of the European Social Partners for the banking sector (and with funding from the European Commission's Directorate General on Employment and Social Affairs) commissioned the research.

having a deep access to Information Systems. With the capability of accessing Information Systems, employees can import and export data from and to the company's host; the information embedded in these data represents the input and the output of the work activities in which they are involved.

Level 3 - the highest in the adopted scale – refers to IT skills that complement the technical knowledge required in banks. They are usually combined with cognitive and analytical capabilities required in new services development staffs and in planning and control activities.

Level 0: No IT Skills	Work is accomplished manually or by using "traditional" terminals. IT skills concern knowledge of a reduced set of standard procedures.
Level 1: Basic	Work is accomplished by "traditional" terminals, by following procedures with a high degree of automation. Work includes data-entry activities, or routine back office controls.
Level 2: Intermediate	Utilisation of personal productivity software (bank's standard applications, spreadsheets, presentations software, advanced word processing, document management applications). IT is used for basic reporting activities, and available skills include import/export of data from/to bank's host. IT is used to get information to sell / cross-sell products to customers.
Level 3: High	IT skills allow to cover all activities from data retrieval and analysis to *ad-hoc* "intelligent" processing and reporting on just-in-time basis. Such skills may be found in Marketing, Customer Relationship Management, Planning and control, investment consultants for affluent customers, etc.
Level 4: IT specialists	Specialist staff engaged in software development, database construction and maintenance, etc. *Such staff has not been considered in the analysis.*

Table 2. The adopted classification of IT skills

Given the features of this scale, the percentage of employees in the workforce with at least level 2 IT skills gives a proxy of how many workers can have deep access into the company's information systems. This proxy expresses also how much a bank exploits IT for supporting decision making processes, rather than for just automating routine activities (Appelbaum & Albin 1989; Hunter & Lafkas 1998).

The weight of level 2 and level 3 IT skills in the workforce gives a proxy of the depth of access of workers into the company's information systems, and therefore of how much a bank exploits IT for supporting decision making processes, rather than for just automating routine activities (Appelbaum & Albin 1989; Hunter & Lafkas 1998).

The survey allowed for collection of 70 questionnaires with reliable data (response rate equal to 30,4%).

Table 3 reports a breakdown of this sample according to the geographic localization and size.

Country	1.000 – 5.000 employees	5.000 – 20.000 employees	> 15.000 employees	Total
Central European countries* and United Kingdom	22 31.43%	8 11.43%	7 10.00%	37 51.43%
Scandinavian countries	3 4.29%	2 2.86%	1 1.43%	6 8.57%
Mediterranean countries	15 21.43%	6 8.57%	6 8.57%	27 38.57%
Total	39 55.7%	15 32.9%	15 11.4%	70 100.0%

** Belaium. France. Germanv. Austria. Switzerland. The Netherlands.*

Table 3. A breakdown of the sample by geographical area and size

4.2 The distribution of IT skills in the organization

The analysis gives evidence of a prevalence of the two intermediate levels of IT skills in all the banks of the sample. The limited average percentage of employees with level 0 IT skills (and, therefore, without any knowledge about new IT systems) demonstrates the pervasive impact of IT systems on banks.

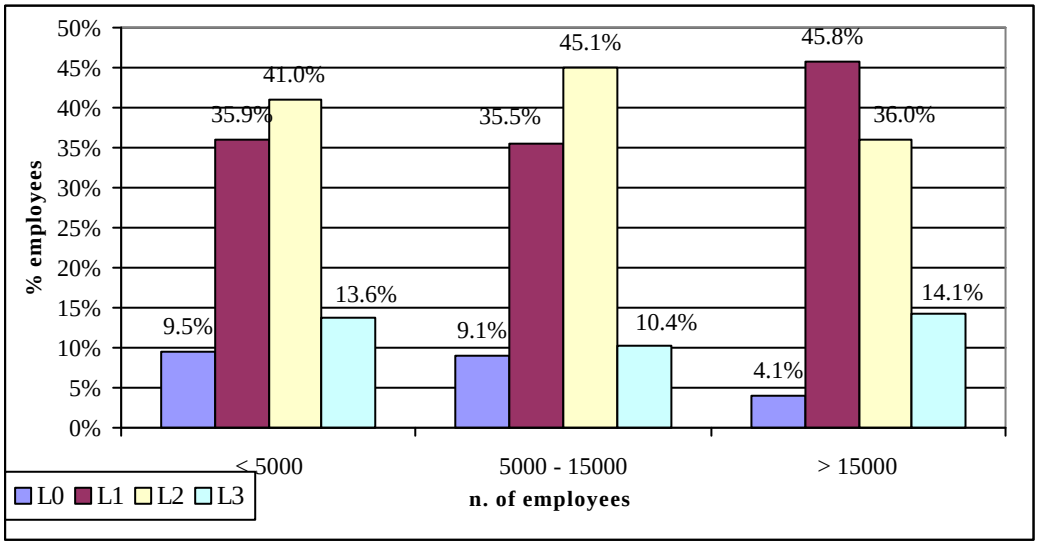

Figure 1. The average distribution of the workforce by IT skills in banks with different size

While some banks are characterized by a prevalence of level 1 IT competencies, other banks distinguish themselves for having a main part of the workforce with that level of understanding of IT systems (level 2) that potentially allow banks to organize work in rather different ways with respect to the traditional bureaucratic models. As figure 1 points out, banks with more than 15,000 employees have average lower levels of IT skills in their workforce. The percentage of employees with level 1 IT skills is significantly (at the 5% level) higher than in the rest of the sample. Moreover, in 67% of these banks, more than 50%

of employees have IT knowledge that can be ranked as below level 2 of the adopted classification. In banks with less than 15,000 employees, this percentage is equal to 40%[2].

The analysis of IT competencies at the more detailed level of each macro organizational area give further results about the allocation of competencies across the company. While in back and in front office, the distribution of employees by IT skills is similar, the localization in Central staffs of all the main technical activities explains the skewed distribution of employees of this area towards the upper two levels of the adopted classification (figure 2). Even at this level of analysis, the differences between small and large banks are clear. Banks with less than 5,000 employees have distribution of IT skills in Central Staff which is particularly concentrated around the two upper levels (68% of employees have at least level 2 IT competencies), in the banks with more than 15.000 workers level 1 still prevail.

The analysis of IT competencies at the level of front office offers some interesting reflections about the transition of the work organization towards new models. Even in this case, the difference between banks with more than 15,000 employees and the other institutes are significantly relevant.

While only 45% of banks with less than 15.000 employees have in front office more than an half of the workforce with a level of IT skills that is lower to level 2, the percentage of banks with this feature is significantly higher (71%) in the cluster of institutes with more than 15,000 employees[3]. This difference suggests a different organization of works in branches between the two clusters of banks.

In the banks where front office employees are mainly distributed around level 2 IT skills, the mode of the distribution on this level suggests that in this area, the organization of work relies on a larger number of employees that can have a deep access to the company's information systems in accomplishing the sales activities. This leads us to think that in these organizations the content of jobs has been evolving for a large part of the employees and that the traditional segmentation on which work in branches was founded in the bureacratic models between tellers and platform workers is progressively blurring. In the bureaucratic models, tellers were invested of very specialized tasks with a limited technical content: therefore the knowledge about IT systems they were required to have was basic (using traditional terminals for data entry activities about transactions made by customer in the branch, for instance) and mainly corresponded to level 1 of the adopted classification. More complex tasks were usually accomplished by platform representatives, employees on an higher qualification level than tellers.

In banks where front office employees with level 2 IT skills is currently prevailing, tellers (who traditionally represent the more widespread role in branches in terms of numerical incidence) have probably been enriched with new and more complex tasks, where IT applications are used as a supporting tool with a high informating capability. Closing or opening an account, pursuing cross selling sales opportunities, offering customer financial products represent example of these tasks. At the first insight coming from the analysis of data showed in figure 2, the transition towards new models of organizing work in branch seems slower in large banks.

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[2] The null hypothesis of statistical independence between size and presence of more than 50% of the workforce with IT skills that are below to level 2 can be rejected at the 10% level of significance (contingency coefficient is equal to 0.215).

[3] The null hypothesis of statistical independence between size and presence of more than 50% of the workforce in front office with IT skills that are below to level 2 can be rejected at the 10% level of significance (contingency coefficient is equal to 0.205)

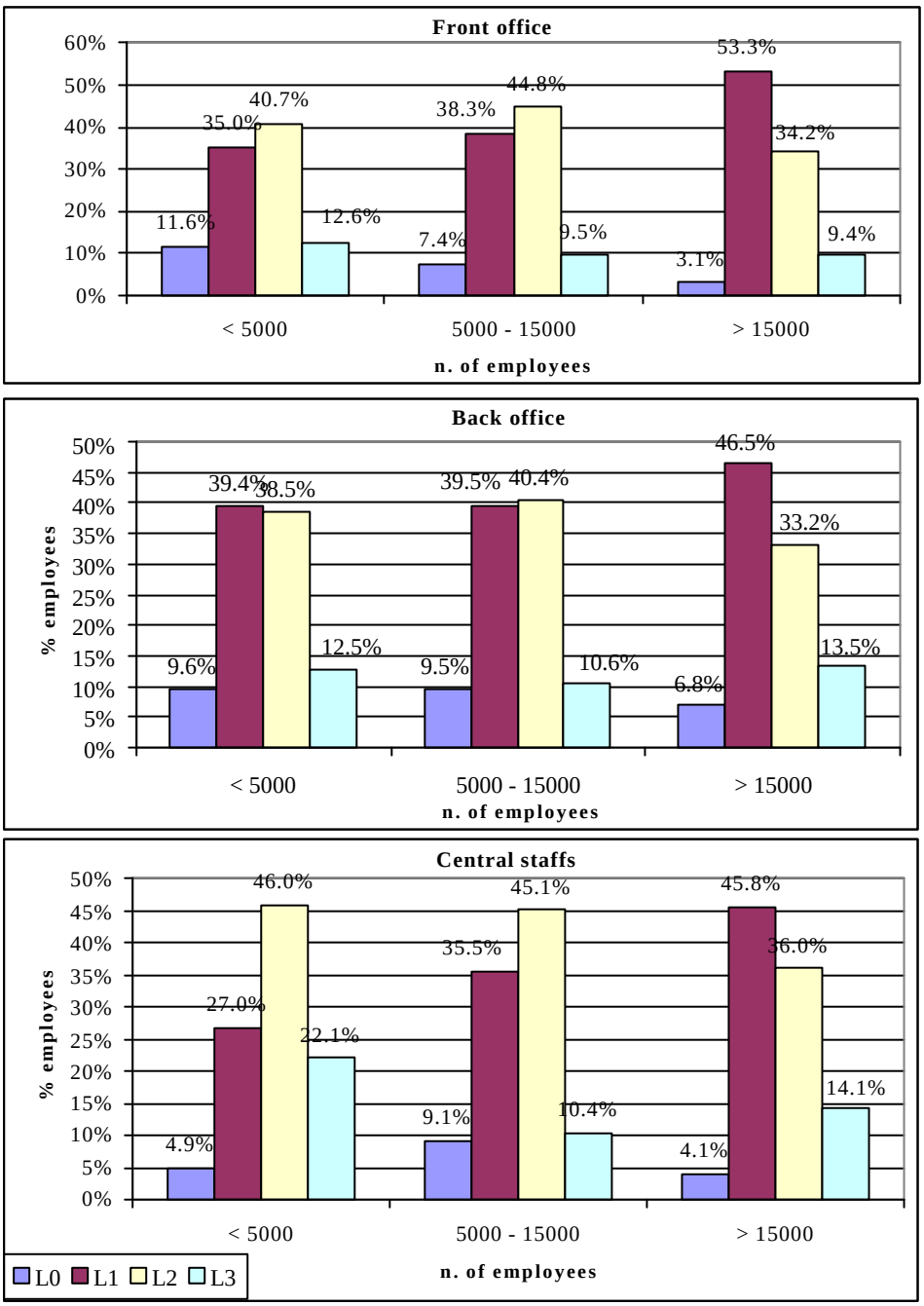

Figure 2. The average distribution of IT skills in the banking macro functions: a comparison on different size levels

Cluster of trends of skills	IT skills level				Number of banks	% employees with at least L2 IT skills*
	L0	L1	L2	L3		
1	*Decrease*	*Decrease*	*Increase*	*Increase*	39	64,06%
2	*Decrease*	*Increase*	*Increase*	*Increase*	26	38,89%

Table 4. An analysis on clusters of IT skills trends in the 1998 – 2000 period

Although differences in the distribution of the workforce by IT competencies raise depending on the size, the analysis on IT skills trend in the period between 1998 and 2000 shows a

homogenous increasing trend for intermediate and upper IT competencies levels. Nevertheless, a cluster analysis on the trends of each skill level in the sample (whose results are presented in table 4) points out that, apart 5 banks that represent out layers in the dynamics of IT skills, two different patterns of upskilling exist[4]. While for a first cluster, composed by banks with a current larger number of employees with intermediate or high IT competencies, the trend in IT skills can be explained with a substitution ratio between elementary - basic levels of IT competencies and the intermediate-high levels, for a second group of banks the trend in IT skills is explained by a general raising of all the skills levels except for level 0 skills. The decreasing trend for L0 IT skills in each bank points out that the number of employees without any knowledge about IT and about the use of a PC is going to disappear soon.

Although an upskilling trend for IT capabilities exists in almost all of the sampled banks, the number of institutes that provide – especially in front office – standard IT training of level 1 to new hired employees is still quite large. Data in table 5 point out how several banks tend to postpone a relevant part of the investment in training to a following moment to the hiring; the reasons for such a choice can be identified in:

1. the willingness of concentrating further investments on employees that have showed better capabilities on the job,
2. the nature of IT training as an "unappropriable investment" by firms, which makes spreading the training investment on a long time horizon more efficient, in order to safeguard the bank against the possibility of an employee's quitting and to increase the

Geographical Area	**Front office skills Level 1**	**Front office skills Level 2**	**Total**
Central European countries and UK	10 27.03%	27 72.97%	37 100%
Mediterranean and Scandinavian banks	18 54.55%	15 45.45%	33 100%
Total	28 40,00%	42 60%	70 100%

Pearson Chi-Square coefficient = 4,753; Significance level = 0,029

Table 5. A comparison of training behaviours between banks belonging to different geographical clusters

Furthermore, connections between such training behaviours and the geographical localization (see table 5) points out how even the different vocational /educational local systems (which in country as Germany, Holland and France allow banks to "transfer" a part of training costs to the public system) can affect managerial choices about banks provided training. British,

[4] A hierarchical clustering method has been used; clusters have been defined using a between groups linkage method and using squared Euclidean distance.

and Central European banks are more likely to provide new hired front office employees IT training about level 2 capabilities. The presence of such a behaviour decreases in Mediterranean and Scandinavian banks.

Nevertheless, other effects should explain the variance of variables under analysis: all the contributions quoted above suggest that reorganisation processes must be one of the main drivers of the competency evolution. The following paragraphs report some findings of the analyses about the relationship between organizational change and the distribution of IT skills.

4.2 Organizational change and IT skills

According to the findings of case studies on the features of restructuring processes in banks, the presence of an organizational change at the level of the bank's macrostructure was declined into the trends of front office, back office area between 1998 and 2000.

Since case studies pointed out that organizational change occurred in banks takes the shape of the expansion of front office combined to the back office centralization, in the analysis of connections between front office IT skills and organizational change, the reconfiguration of macrostructure was considered by discriminating banks where the variation rate of front office employees between 1998 and 2000 has been more than + 5% (when the company' size is more than 5,000 employees), or more than 10% (in banks with a size between 1,000 – 5,000).

Factor	**Factor value**		**% employees with at least L2 skills - Mean value**	**% employees with at least L2 skills – Std. Dev.**
AREA **	Central european countries and UK		64.75%	22.83%
	Scandinavian countries		48.35%	20.44%
	Mediterranean countries		40.16%	23.19%
*FOTREND X SIZE**	*FO TREND*	*SIZE*		
	Costant	< 5.000	41.77%	25.13%
		5.000 – 15.000	45.78%	26.18%
		> 15.000	55.17%	23.06%
	Relevant growth	< 5.000	63.73%	24.56%
		5.000 – 15.000	75.58%	21.80%
		> 15.000	54.00%	20.98%

Levene's Homegeneity Test: F =1.241; Significance level = 0.272. The test tests the null hypothesis that the error variance of the dependent variable is equal across groups. In this case (significance level >0.10) the null hypothesis cannot be rejected.

***: the factor is significant at the 1% level; *: the factor is significant at the 5% level*

Table 6. The analysis on variance on the percentage of employees (in the whole organization) with at least Level 2 IT skills

The choice of setting for small banks an higher threshold for the employees variation ratio stems from the willingness of not interpreting in these companies as a relevant organizational

change absolute variations in the employment levels of limited size (which correspond to variation rates higher than 5% in banks).

Therefore, the presence of an organizational change has been considered using a dummy variable (*FOTREND*), which is equal to 1 in the case of a relevant growth of front office employees between 1998 and 2000.

An analysis of variance, considering the percentage of employees with level 2 or level 3 IT skills as the dependant variable, was carried out both in front office both referring to the whole workforce. In front office, a further interest to the analysis stems from considering the dependant variable as a proxy of the number of employees who have been invested by a greater involvement in sales activities, since they are supported by a level of IT capabilities that allow to have larger competencies in decision making processes required by these activities.

Other than the presence of a relevant growth of the front office in terms of employees, we considered the following factors:

- the bank size (*SIZE*), distinguishing by the three groups considered above;
- the country where the bank operates; for this factor, we used a variable (*AREA*) which discerns between banks operating in the Central European Countries or in the United Kingdom, banks operating in the Mediterranean Area or in Portugal and banks from the Scandinavian countries.

Regarding the analysing on the number of employees with at least level 2 IT skills in the whole organization (table 6), we found that:

- the area where the bank operates represents a significative factor in explaining the variance of the dependant variable; more in details, in Mediterranean banks the mean of the percentage of employees with at least level 2 IT skills is significantly lower than in the remaining banks.
- An effect of interaction between the presence of a relevant growth of front office and the size exists in explaining the variance of the dependant variable; more in details, where the front office has been growing relevantly between 1998 and 2000 the share of employees with the two upper levels of IT skills is significantly higher. However, as table 6 points out, this trend does not occur when the bank size is more than 15.000 employees.

Regarding the analysis on the percentage of front office employees with the upper two levels of IT skills in the adopted classification (table 7), we found:

- That the first order effect due to the area where the bank operates is still significant;
- A significant first order effect due to the presence of a relevant growth of the front office between 1998 and 2000;

The evidence, showing a positive effect due to the front office positive growth rate on the percentage of employees with at least an intermediate level of IT knowledge, seems to confirm hypotheses about connections between upskilling phenomena and reconfiguration of banks macrostructure.

Factor	Factor Value	% Front Office employees with at least L2 skills - Mean value	% Front Office employees with at least L2 skills Standard deviation
AREA **	Central european countries and UK	63.33%	26.40%
	Scandinavian countries	44.50%	23.72%
	Mediterranean countries	37.50%	30.78%
*FOTREND X SIZE**	Constant	42.17%	27.81%
	relevant growth	64.86%	27.15%

Levene's Homegeneity Test: F =0.941; Significance level = 0.527. The test tests the null hypothesis that the error variance of the dependent variable is equal across groups. In this case(significance level > 0.10) the null hypothesis cannot be rejected.

***: the factor is significant at the 1% level; *: the factor is significant at the 5% level*

Table 7. The analysis on variance on the percentage of front office employees with at least Level 2 IT skills

Even though the analyses on variance did not show any first order significant effect due to the size, the effect of interaction we found out between this variable and the growth of front office underlines the greater difficulties that large banks could cope with in intervening on the available human capital. In these organizations the costs of adapting the social systems to the introduction of new technologies can be higher than in small banks, due to the larger size of the workforce.

5. Conclusions

This article has analysed the evolution of IT skills in banks and showed how the transition towards new organisational models is correlated with an overall upskilling concerning IT knowledge. The evidence provided about the positive correlation between the intensity of the organizational change (considered through the growth rate of front office) and the level of IT skills in banks points out that the availability of IT skills of intermediate level in the workforce is a necessary condition for the transition towards new organizational models

On the basis of the obtained evidence, a "substitution" phenomenon can be hypothesised between competencies about the working tools (Information Technology) and competencies about the technical content of the job, based on financial knowledge and risk assesment skills. While the needs for the former ones increase, the demand for the latter ones remains stable or decreases, thanks to the high product standardization and thanks to the capability of IT of codifying in software market and technical knowledge.

Other than the presence of a relevant organizational change, the geographical localization (and therefore the different corresponding industry models of each area) is a factor that can have a systematic effect on the dependant variable analysed. Mediterranean banks distinguish themselves for a lower level of IT skills.

On the basis of the obtained evidences, the following reflections arise:

- The increasing presence in banks of intermediate IT competencies, beyond allowing more employees a deeper accessibility to data located in corporate information systems, can progressively favour the moving of the decision making power towards employees

involved in sales processes. On the other hand, the product standardization and the codification in software of the technical knowledge (two aspects pointed pout by case studies) theoretically bound the room for decision-making power to few relevant aspects of the tasks that employees involved in sales activities must accomplish.

- Given this trade off between accessibility to information and codification of knowlege, it is worthwhile to reflect about the real content of work in the new organizational models of banks. Is the IT upskilling connected with a transformation of work towards jobs that are effectively enriched of more technical contents and of higher decision making power? Or, differently, the adoption of new IT systems, allowing the codification of the market and technical knowledge developed in central staffs, "impoverishes" most of the roles in front office, making technical knowledge requirements less important, regardless of the deeper accessibility to customers data by roles in this function? Evidences stemming from the current study provide answer to this question only partially (even because of the choice of the three macro functions as unit of analysis, instead of a set of specific jobs). It's therefore difficult to deal with the question of new tayloristic organizational forms in banks as an outcome of the overcoming of the traditional bureaucratic models. Explanatory case studies represent a possible development of the current study, since they can provide a more in depth view of the competencies requirements underlying the main roles.

6. References

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