

An Experimental Methodology for Industrial Redundancies: The “Human Capital Map”

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Abstract Facing redundancies is a recurrent issue in contemporary societies. Businesses have entered a regime of continuous restructuring in which the reorganization of production and labour is no longer a cyclical occurrence in the context of economic hardship or paradigmatic change: restructuring is an integral part of normal corporate activity, implemented also as a pro-active strategic choice to realign and improve organizational efficiency. From a policy perspective, coping with lay-offs is highly problematic and so is for the workers involved. In this context, the EU urges for anticipation. Based on a fieldwork in 35 companies of the Abruzzo region (Italy), this article presents an experimental methodology aiming to concur to the re-employment of laid-off workers. The Human capital map, enabling the analysis and classification of the skills and competencies that belong to differentiated job positions and to ascertain their similarity (or not) to the requirements of other jobs, is deemed to be an innovative instrument to be used, among the others, to anticipate and ease situations of redundancies. The findings show a high potential for job transfers both within and across industrial sectors.

Keywords Redundancies, Job analysis, Human Capital, Downsizing

1. Introduction

In the last decades companies in advanced countries have dramatically increased the implementation of restructuring decisions. Such strategic choices often involve redundancies contributing to enlarge the ranks of unemployed people and render it more acute the social concern over job losses.

Eurostat estimated that 26,5 million men and women in the EU-28 were unemployed in 2013 at the height of the global economic and financial crisis. Even though this level declined to around 20 million in January 2017, unemployment is still a major issue for policy makers in EU countries. The data clearly show the effects of the global economic and financial downturn, which started in 2009 and ended only in the last quarters. If some business communities have proved far more resilient than others, the effects of the downturn and of the consequent corporate downsizing have generally been dramatic.

In contrast to neo-classical economics suggesting that market adjustments are usually unproblematic following the need to re-align organizations with market expectations, more progressive economic positions and sociological insights argue that staff redundancies rise significant economic and social questions and urge innovative but

effective policy interventions. For non-conventional economic perspectives, companies' patterns of adjustment are not uniform nor predictable and are assessed by considering a wide range of factors other than the cost of labour (Einarsdóttir, Ólafsdóttir & Arnardóttir, 2011). Irrespectively of the origin of downsizing events (economic downturn or specifically reorganizational corporate strategy), redundancies are performed selectively. Sociological contributions on the theme concern mainly the socio-economic consequences of lay-offs on an individual and especially collective level. More macro-sociological insights focus on the institutional influence on companies' behaviour: the socio-institutional framework, comprising formal and informal consolidated behaviours is not simply seen as influencing and regulating actor's action but also affecting their cognitive schemes. In all cases, staff redundancies are perceived as a substantial social problem.

From a policy perspective, coping with lay-offs is highly problematic. Passive policies are generally deployed but an increasing re-orientation has taken place in the public arena towards more active interventions which however require budget investments and/or other resources' mobilization. In this context one must mention the EU's emphasis on the processes of anticipation and governance of firms' restructuring phases both in terms of strategic anticipation (to avoid a crisis) and an operative one (to face an on-going crisis) (Negrelli and Pichierri, 2010).

This article presents the results of a case study which developed a methodology to cater in advance for the possible

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reemployment of laid-off workers. The Human capital map, enabling the analysis and classification of the skills and competencies that belong to differentiated job positions and to ascertain their similarity (or not) to the requirements of other jobs, is deemed to be an innovative instrument to be used among the others to ease situations of redundancies.

The rest of this paper is divided into four sections. After this Introduction, the second section presents an interdisciplinary literature review on the key role played by human capital and skills in organizations and the problem posed in case of redundancies. After presenting the Human Capital catalogue, an experimental methodology applied to a case study involving 35 manufacturing companies operating in Abruzzo (in the central of Italy), section four discusses the main research results. Comment and hypotheses for further research are presented in the concluding section.

2. Redundancies, Human Capital and Skills

Since its far-from-recent inception, the literature on the so-called Human capital theory (see, *inter alia*, Friedman & Kuznets, 1945; Mincer, 1958; Schultz, 1963; Becker, 1962, 1964, 1965) has focused either on “general-purpose” or on “firm-specific” human capital. More specifically, general human capital (for instance, literacy) supports productivity not only in the firm in which the employee currently operates but at systemic. In contrast, firm-specific human capital enhances the productivity of the employee in her/his current company, but not elsewhere. It follows that this type of human capital is generally deemed to be highly risky; should the given firm close, or an industry-wide crisis occur, the transfer of such a capital to other firms will probably be inhibited.

Since Neal’s contribution (1995), however, the literature has accorded firm-specific human capital less importance than it has to industry- or sector-specific capital. His findings suggested that they could be specific not of a certain industry but of “a set of jobs that are associated with the intersection of certain occupations and industries” (1995, 670). In the same vein, Helwege (1992: 77) found that 11 job positions were found in as many as 20 industries, confirming that such organizational units are quite “transversal”, therefore “the distinction between industry and occupation is not very clear”. More recently, Lazear (2003, 2009) has proposed the so-called “skill-weights view” of firm-specific human capital. Within this perspective all skills, if considered in isolation, are general in the sense that they are also used in other firms. However, different companies will adopt these common, “general” skills in differing combinations. Consequently, the specific mix of skills required in one firm may be firm-specific, in the sense that it may be unlikely to find the same combination of skills in any other firm. Therefore, the “skill weights view” suggest paying attention to the mix of required skills rather than to the single “general”

one. At the same time, Gibbson and Waldman (2004) proposed the idea of task-specific human capital, i.e., the part of human capital an individual acquires on his/her job that is specific to the task he/she performs and not to the companies in which he/she is engaged. This concept was later partially modified by Gathmann & Schönberg (2006, 2010), according to whom skill/task-specific human capital is not specific to the job within a firm but may be also transferable across jobs within the same firm.

To summarise, the development and adoption of the skill/task-specific human capital approach leads to the conclusion that when staff are made redundant and a worker switches firms, previously developed human capital will not be unutilized (as assumed in the traditional human capital firm-specific perspective). On the contrary, it will be unused when a worker switches jobs and is assigned to a new set of tasks, within the same firm or upon transfer to (a) new firm(s).

With concern to the sociological literature, it has especially emphasized the metamorphosis of work. Among other things, higher levels of education and increasing non-manual jobs seems to provide workers with greater autonomy and more task discretion (Gallie et al. 1998). The wider combination and integration of *savoir faire* (more occupation specific competencies) and *savoir être* (more transversal and inter-personal competencies) is deemed to have opened up new opportunities for workers who are called to participate and contribute in workplaces with more autonomy, creativity and flexibility. Already in the mid-1980s, more empirical studies had emphasized the relevance of individual characteristics and of more common and interchangeable skills for work (De Rita, 1984; Cacace, 1985; Bresciani, 1985; Contessa, 1987 cited in Di Francesco, 1993). Nonetheless, sociological accounts highlight also the possible ambivalent nature of the above mentioned transformations as new forms of inequalities and exclusion can arise in relation to flexibility, insecurity, stress (to mention a few, Castel, 1995; Sennett 1999; Beck, 2000; Gallino, 2001).

The discourse on the strategic importance of human capital and of appropriate competencies within firms to generate especially innovation has been largely adopted also by a number of international and national organizations and has soon become a dominant theme on their agendas (OECD, 2010, 2011a,b; CEDEFOP, 2012; ISFOL, 2012; EU, 2010a,b). By endorsing the decline of work conception as an application of standardized knowledge acquired during the educational path and useful all lifelong, in 2006 the European council and parliament adopted a framework of reference relative to key competencies to lifelong learning to provide not only a convergence of objectives but ultimately a convergence of policy approaches among member states.¹ The key concepts of ‘employability, adaptability, flexibility,

¹ Such a framework identifies and defines the key competencies that EU citizens ought to have for their own personal achievement, for social inclusion, for active citizenship and employability.

activation, lifelong learning, entrepreneurship, and more lately active welfare and quality in work' have slowly become 'common' concerns for member states, stimulating a voluntary system of coordination.

It is apparent, however, that even the practical consequences of such a position - that many consider simply rhetorical - are far from simple. If investment in human capital has become a strategic dimension of development and employment, more problematic is to identify what specific competencies are required to produce the desired effects or to clearly identify the mechanisms through which specific competencies end up having effects on firms' performances (Nosella et al. 2003) and, at a wider scale, on development or innovation (Edquist 2005 in OECD, 2011a). At the same time, concerns emerge on the capacity of firms to create, circulate and manage knowledge. Especially in times of lay-offs, the idiosyncratic nature of knowledge production and skills, that is their non-codified and tacit nature, would have an impact on workers' employability.

From a policy perspective, it is a fact that a number of public and private initiatives have launched a series of surveys to partly fill the knowledge gap about market trends in terms of competencies and skills demand. Based on the experience of the UK and Ireland, since 2010 Excelsior² has provided a wide array of information on the theme. ISFOL produces annual reports to provide insights on the demand of professional profiles and of competencies. To this purpose, it is worth mentioning the project carried out in the last ten years on behalf of the Ministry of Labour and Social Policies based on the recognition that a timely analysis of competence and skill needs is a crucial upstream activity of programming processes (Mereu and Franceschetti, 2013).³ At international scale, OECD has devoted a number of works to define competencies and key competencies as well as specific studies to explore the causal relation between the supply of higher levels of education, training and skills and increased demand for technical and organizational innovation.

It seems therefore appropriate to look for the development of innovative tools to manage the re-employment of redundant workers, against a background of modest effectiveness of post-downsizing retraining programs. It would be extremely useful to ascertain whether it would be possible, within the scenario of a generalized downturn, to leverage the specific set of skills and knowledge owned by the laid-off worker so that s/he may play a different role in another company, and even in another industry. For instance, it would be interesting to know, in advance, whether a maintenance operator in a mechanical company can be

converted, without huge training investments, into a food company line operator.

3. The Human Capital Map Methodology

The proposed methodology aims to identify opportunities for laid-off workers to move between jobs on the basis of skill-specific human capital. In this respect, we emphasise that we only consider job transfers that do not imply a reduction in employees' status. Although laid-off workers often accept jobs that do not exploit their previously developed human capital, it is widely recognized that such workers easily become less motivated in their new positions. Imbalances in skill requirements can generate another form of asymmetry, namely, mono-directional mobility. In other words, the transfer between two job positions may be available from A to B but not from B to A. For example, consider a book-keeper operating in a medium-to-large company in which an Enterprise Resources Planning system (such as SAP) is implemented. He/she can easily be transferred to an analogous position in a small company that does not use software of the complexity of SAP; this type of transferee will possess the common knowledge and competencies inherent to accountancy. In contrast, the accountant who had his/her experience in a small company cannot be transferred to the medium-big company because he/she lacks of knowledge of ERP systems.

To the best of authors' knowledge, in the extant human resource literature there is not a codified methodology to implement a comparison among job positions belonging to differentiated set of companies, excluding the case of wage compensation surveys. Therefore, we propose an experimental methodology that we call Human Capital Map.

It consists of the following steps:

- a) the definition of a sample of firms in a specific territory. Job transfers between companies in proximity areas are generally preferred;
- b) an analysis of the task-specific human capital inherent to each of the positions identified within the chosen firms. To this end, company job descriptions are the most important information source. With this respect, a "job" is defined as "a set of tasks elements grouped together under one job title and designated to be performed by a single individual" (Ilgen and Hollenbaeck, 1991, 173). Consequently, the job analysis is conducted collecting work-related information for a specific job as it currently exists within the organization (Palmer and Valet, 2001; Schneider and Konz, 1989). Singh (2008) pointed out such a methodological tool is at the hearth of every human resources management programs, like selection and staffing (Carless, 2007, Gatewood & Feild, 1994; Jenkins & Griffith, 2004; Schofield, 1993; Wernimont, 1988; Wilde, 1993), training and

² It deals with the information system of the Italian Chambers of Commerce in collaboration with the Ministry of Labour.

³ It deals with an information system (www.professionionoccupazione.isfol.it) concerning professional and training needs from both a quantitative perspective and a qualitative one. On the one hand, together with ISTAT, ISFOL has developed a taxonomy of professions; on the other, by referring to the US O*Net network, it worked on the content of each profession.

development (Campbell, 1989; Mitchell, Ruck, & Driskill, 1988; Wooten, 1993), job descriptions and job design (Davis & Wacker, 1988; Gael, 1988, Konczak, 2007). However, this managerial tool might be not available, especially in SMEs. In such cases an in-depth interview must be conducted with the person in the job position and with his/her direct supervisor. An important additional source of information is the Human Resources Department Manager, should this position exist. The analytical process described here must be carried out for all the positions belonging to each of the chosen companies;

- c) the classification of the evaluated job positions into “professional families”, i.e., groups of homogeneous positions - for instance, the Human Resources Management (HRM), or the Supply Chain Management (SCM) functions. This classification is deemed to facilitate subsequent comparison of, and identification of features in common between, the various job descriptions under investigation;
- d) the comparison of the task-specific human capital components inherent to each couple of occupancies classified as belonging to the same “professional family”, and hence the identification of the possible similarities between them. If the set of knowledge and

competencies required by two job positions (belonging to different companies) are homogeneous, it is possible to assume that the current occupants of the given job could in the near future be transferred to the other without substantial investments in retraining. We define such job positions as “aggregated”, or “second level”. Obviously, it is possible for more than two positions – each belonging to a different company – to be coherent with a single aggregated job position. The greater the clustering around a single aggregated job position, the more likely it will be that a laid-off worker will be able to move to other companies with limited loss in his/her task-specific human capital. In order to simplify the implementation of this step, we propose to arrange a square matrix for each professional family. Job positions belonging to the investigated professional family are grouped by companies and inserted in each of two matrix axes (Fig. 1);

- e) the definition of a new, univocal job description for each aggregated job position identified in the previous step;
- f) the creation of a common data base of all the aggregated job positions found, to be used in response to redundancies.

Professional Family

		Company 1				Company 2				Company				Company m			
		JP 1	JP 2	...	JP n	JP 1	JP 2	...	JP k	JP 1	JP 2	...	JP j	JP 1	JP 2	...	JP h
Company 1	JP 1																
	JP 2																
	...																
	JP n																
Company 2	JP 1																
	JP 2																
	...																
	JP k																
Company	JP 1																
	JP 2																
	...																
	JP j																
Company m	JP 1																
	JP 2																
	...																
	JP h																



Aggregated/Second level Job position

Figure 1. Matrix for the evaluation of aggregated job positions (JP)

4. The Empirical Application and Research Results

The methodology presented in the previous section was applied to a sample of 35 industrial companies located in Abruzzo, a region in Central Italy. The local labour market has dramatically suffered both from the global economic crisis, following the financial one, and from the earthquake at L'Aquila, the region's capital city, in 2009.

The first step was to identify the seven most important industries in the local economy, ranked based on the number of employees and contribution to the regional Gross Domestic Product (GDP). The industries that emerged from this process were:

- 1) Clothing: the economic importance of this industry to Abruzzo's economy is determined by a clothing-specific industrial district (Val Vibrata) in the Province of Teramo (in the Region's north-east). Historically a specialist in contract manufacturing, the area was duly and severely affected by competition from low labour cost countries, and suffered immense staff redundancies;
- 2) Chemical and Pharmaceutical: this sector is represented by big Italian and multinational companies – such as Sanofi Aventis and Dompé - which opened their plants in Abruzzo during the '70s stimulated by EU financial incentives to attract national and foreign direct investments. However, it deals with production plants whilst companies' headquarters are located outside of Abruzzo. Accordingly, available job positions in this sector are exclusively operation-related;
- 3) Electronics: this sector downsized severely in the '90s, especially in the L'Aquila area. However, some excellent companies remain, such as Micron Technology's semi-conductors business (which formerly belonged to Texas Instruments);
- 4) Food: this industry covers all four Region's provinces and some companies are globally known i.e. the pasta brand De Cecco. A food retailer was also included in the sample to have a more general overview of the whole supply chain;
- 5) Furniture: this is another industry that has shrunk substantially in recent years. It is mainly located in the province of Teramo;
- 6) Mechanical - Automotive: the mechanical sector is the leading industry in terms of regional GDP, number of employees and contribution to regional exports. Given the huge heterogeneity of this sector, we focused on two specific business areas. The first, Automotive, includes companies like Honda and Fiat Sevel;
- 7) Mechanical - Plant Engineering: it is the second mechanical specific business.

In collaboration with the major regional confederation of industry (Confindustria Abruzzo), we selected a set of 50 companies. After presentation of the research's aims and

methodology to the given companies' top management, thirty-five agreed to take part in the project (Tab. 1). Each of the seven investigated industrial sectors comprised both small-medium and large companies. For national and foreign companies with an exclusively manufacturing unit in Abruzzo, we only investigated positions actually "open" at the given units. This feature partially explains the scarcity of job positions belonging to R&D and marketing activities.

Each of the 35 selected companies was personally visited with the subsequent implementation of the research methodology. More specifically, the job description analysis was conducted and/or direct vis-à-vis interviews were carried out with people belonging to each position and their direct supervisor. When possible, collected data were discussed with the Human Resources Manager. As a result, 1,515 job positions were identified and analyzed based on the task-specific human capital components. Such positions were widely spread between and within the industries investigated (Tab. 2). The substantial variation in number of employees per industry explains the appreciable fluctuation in the average number of job descriptions per company. For instance, while in the Food and Furniture industries we found less than twenty job descriptions per company, in the clothing sector we found more than seventy. The number of job descriptions analyzed also varied heavily between companies operating in the same business area. For instance, while one clothing company had only sixteen distinct job positions, another provided 171 (i.e., 11.28% of the total positions investigated). Quite similarly, the range in the Electronic industry varied from a minimum of 10 to a maximum of 142 job positions per firm. These findings are generally attributable to the simultaneous presence in the investigated sample of small, medium and big companies. Not surprisingly, small firms typically assign various tasks to a single person, as in the case of maintenance activities, which are often performed by employees operating in the manufacturing area.

To simplify the comparison of the job descriptions, we identified eleven professional families:

- 1) MFG (Manufacturing): all job positions narrowly belonging to production activities (such as line operator or production planner) were classified in this family. The job positions of employees involved in differentiated operational activities (for instance, manufacturing, maintenance, warehouse management, etc.), were classified as belonging to the professional family in which the given workers spent the majority of their work-time;
- 2) MAI (Maintenance);
- 3) GS (General Services): this is a heterogeneous professional family that comprises positions such as receptionist and office clerk;
- 4) EHS (Environment, Health & Safety): it should be noted that, in small- and medium-sized companies, tasks such as these are often assigned as an additional role to workers mainly involved in manufacturing

and/or maintenance activities. For the purposes of this research, only job positions exclusively dedicated to EHS were included in this professional family;

- 5) QUA (Quality): as for EHS, we only counted positions whose occupants were exclusively devoted to Quality activities;
- 6) HRM (Human Resources Management): staff involved in payrolls tasks were not included in this professional family because of the similarity of such tasks to those of administration;
- 7) AFC&L (Administration, Finance and Controlling, & Law): Legal Department operators were included in this professional family because of the scarcity of such positions in the 35-company cohort;
- 8) ICT (Information & Communication Technology);
- 9) SCM (Supply Chain Management);
- 10) MKT (Marketing & Sales);
- 11) ENG (Engineering): this family included job positions involved in the product or process development activities that distinguish themselves from those of Research & Development. Since the entire 35-company cohort yielded only one R & D position, we excluded this family from consideration.

The breakdown of job positions on the basis of professional family is summarized in Tab 3. As already stated, appraisal of these data should account for the fact that some of the companies involved in the study undertake exclusively manufacturing activities. As a consequence, job positions related to the so-called operative cycle (i.e. Manufacturing, Maintenance, EHS, Quality, Engineering and SCM) are much more common than those related to Marketing and Sales. Indeed, manufacturing job positions were found in all but one (34 out of 35) of the companies investigated, the exception being the previously mentioned food retail firm. At the same time, it is interesting to note that 6 out of the 11 given professional families feature in all industries and the other 5 families feature in 6 out of the 7 industries.

The combination of industry-professional family breakdowns provides interesting insights (Tab. 4). For instance, in the Furniture industry, 4 out of 11 professional families have no job positions. A partial explanation for this feature could be the generally small size of companies belonging to this industry; it is also likely that some of the tasks belonging to a certain professional family might be included as “minor tasks” within other families (as evidenced for EHS and QUA). Conversely, some positions are highly concentrated within a specific industry; 43.5% of GS positions cluster in the Automotive industry, while – more predictably – 46.7% of ICT positions occur within the Electronic sector.

Having classified, as previously described, the skill-specific human capital components related to each of the 1,515 investigated job positions, we analysed the database for job position homogeneity between two or more companies. This entailed comparison of each job position

within a given professional family with all family-equivalent job positions in all companies. The process of comparison and the identification of homogeneity (i.e. aggregated job positions) are represented by the matrix in Fig. 1; in all, 173 found. These AJP represent 937 individual job positions, i.e., 61.85% of the job descriptions stored in the data base (Tab. 5). This percentage implies both a high level of homogeneity between the positions investigated and, in turn, manifold opportunities for inter-company transfers in response to staff redundancies. More specifically, each of the 173 AJPs has considerable similarities with an average of 5 other positions. This average datum derives from a variation between a minimum of 2 positions (related to the Marketing and Sales family) and a maximum of 9 (related to a single position within the Administration, Finance, Control & Law professional family). An extremely interesting finding is that these similarities emerged not only between the predictable (because transversal) activities of value chain support activities (such as AFCL and HRM), - but also between those belonging to primary activities (such as MFG and ENG).

Further analysis of our findings (Fig. 6) demonstrates that professional families have AJPs in at least 5 of the 7 industries investigated, and that Food and Furniture are the most heterogeneous. However, it should be noted that this latter finding mainly regards the more innovative professional families – such as ENG and ICT – which are generally not very common in the Food and Furniture industries. The same two industry sectors, both below our cohort’s average in terms of size, singularly lacked representation for the EHS family positions, which are typically covered as an adjunct for employees whose main involvement is with other activities (generally those of the MFG family).

In 4 of the 11 professional families, companies with job positions outnumbered those with aggregated job positions. In other words, transversality is more limited here, a finding which could be explained by the specificity of certain organizational activities to the firm/industry-context (for instance, those related to the MKT professional family).

To deepen the analysis of aggregated job position transversality, Tab. 7 identifies the distribution of professional families in terms of the number of industries in which they were found. As it is evident, AFCL, SCM and HRM are almost omnipresent, while MFG and Quality are more narrowly distributed. Specifically, more than 90% of MFG job descriptions belong to the two mechanical industries (Automotive and Plant Engineering), whose reciprocal similarity exceeded that of any other couple within the cohort. In contrast, around 50% of aggregated job positions related to AFCL were found in 6 of the 7 industries investigated. This finding was quite expected, since AFCL is a classic value chain support activity, while MFG and ENG are generally more industry-specific. SCM proved to be another highly transversal family; although pertinent AJPs bunched significantly in 4 of the 7 sectors, overall distribution spread over 6 of the sectors.

Table 1. Respondent firms by industry

Industry	Respondents
Chemical & Pharmaceutical	7
Clothing	3
Electronic	4
Food	8
Furniture	3
Mechanical Automotive	6
Mechanical Plant Engineering	4
Total	35

Table 2. Investigated job positions (JPs) by industry

Industry	Number of JPs	Average JPs per firm	Minimum JPs per firm	Maximum JPs per firm
Chemical & Pharmaceutical	355	50,7	29	90
Clothing	220	73,3	16	171
Electronic	231	57,8	10	142
Food	173	21,6	11	42
Furniture	55	18,3	7	32
Mechanical - Automotive	328	54,7	16	162
Mechanical - Plant Engineering	153	38,3	23	65

Table 3. Investigated job positions (JPs) by professional family

Professional family	Number of JPs in the family	Num. of companies with having JPs in the family	Num. of industries with having JPs in the family
AFCL	168	33	7
EHS	31	17	6
ENG	124	20	6
GS	23	13	6
HRM	72	25	7
ICT	60	18	6
MAI	115	26	7
MFG	389	34	7
MKT	171	21	7
QUA	136	28	6
SCM	226	32	7

AFCL: Administration Finance Controlling & Law

EHS: Environment, Health & Safety

ENG: Engineering

GS: General Services

HRM: Human Resources Management

ICT: Information & Communication Tech.

MAI: Maintenance

MFG: Manufacturing

MKT: Marketing & sales

QUA: Quality

SCM: Supply Chain Management

Table 4. Investigated job positions by industry and professional family

	AFCL	ENG	EHS	GS	HRM	ICT	MAI	MFG	MKT	QUA	SCM	TOT
Automotive	23.8%	28.2%	16.1%	43.5%	25.0%	13.3%	16.5%	15.9%	27.5%	30.1%	19.0%	328
Ch. & Ph.	13.7%	14.5%	38.7%	30.4%	16.7%	21.7%	23.5%	26.2%	20.5%	38.2%	23.9%	355
Clothing	17.9%	27.4%	3.2%	8.7%	15.3%	11.7%	3.5%	9.3%	30.4%	5.9%	15.5%	220
Electronic	16.7%	18.5%	22.6%	4.3%	23.6%	46.7%	34.8%	11.1%	6.4%	11.0%	8.0%	231
Food	12.5%	0.0%	9.7%	8.7%	9.7%	3.3%	14.8%	13.4%	6.4%	8.8%	20.4%	173
Furniture	3.0%	1.6%	0.0%	0.0%	1.4%	0.0%	0.9%	8.7%	2.9%	0.0%	3.1%	55
Plant Eng.	12.5%	9.7%	9.7%	4.3%	8.3%	3.3%	6.1%	15.4%	5.8%	5.9%	10.2%	153
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	1.515

AFCL: Administration, Finance Controlling & Law

EHS: Environment, Health & Safety

ENG: Engineering

GS: General Services

HRM: Human Resources Management

ICT: Information & Communication Tech.

MAI: Maintenance

MFG: Manufacturing

MKT: Marketing & sales

QUA: Quality

SCM: Supply Chain Management

Table 5. Characterization of obtained Aggregated Job Positions (AJPs)

Professional family	Investigated JPs	Obtained AJPs	JP belonging to obtained AJPs	% of investigated JPs belonging to obtained AJPs	Average num. of JPs belonging to a single AJP
AFCL	168	15	136	80.95%	9.07
EHS	31	7	26	83.87%	3.71
ENG	124	11	41	33.06%	3.73
GS	23	6	22	95.65%	3.67
HRM	72	11	68	94.44%	6.18
ICT	60	9	42	70.00%	4.67
MAI	115	15	84	73.04%	5.60
MFG	389	53	259	66.58%	4.89
MKT	171	10	27	15.79%	2.70
QUA	136	24	76	55.88%	3.17
SCM	226	18	156	69.03%	8.67
Total	1,515	179	937	61.85%	5.23

AFCL: Administration, Finance Controlling & Law

EHS: Environment, Health & Safety

ENG: Engineering

GS: General Services

HRM: Human Resources Management

ICT: Information & Communication Technology

MAI: Maintenance

MFG: Manufacturing

MKT: Marketing & sales

QUA: Quality

SCM: Supply Chain Management

Table 6. Aggregated Job Positions (AJP) distribution by industry and company

Professional family	AJPs	Num. of Industries having with AJPs in the family	Industries with no AJPs in the family	Num. of companies with having AJPs in the family	Num. of companies with having JPs in the family	%
AFCL	15	7		33	33	100.0%
EHS	7	5	Food Furniture	15	17	88.2%
ENG	11	6	Food	16	20	80.0%
GS	6	6	Furniture	13	13	100.0%
HRM	11	7		25	25	100.0%
ICT	9	6	Furniture	18	18	100.0%
MAI	15	7		26	26	100.0%
MFG	53	7		34	34	100.0%
MKT	10	5	Food Electronic	13	21	61.9%
QUA	24	5	Food Furniture	22	28	78.6%
SCM	18	7		32	32	100.0%

AFCL: Administration, Finance Controlling & Law

EHS: Environment, Health & Safety

ENG: Engineering

GS: General Services

HRM: Human Resources Management

ICT: Information & Communication Technology

MAI: Maintenance

MFG : Manufacturing

MKT : Marketing & sales

QUA : Quality

SCM: Supply Chain Management

Table 7. Aggregated job descriptions (AJPs) by professional family and industry

Professional family	AJPs	Number of industries in which the AJPs are present						
		1	2	3	4	5	6	7
AFCL	15		4	3	1	2	4	1
EHS	7	1	3	2	1			
ENG	11	8	2		1			
GS	6	4	2					
HRM	11		3	3	1	2	2	
ICT	9		4		4	1		
MAI	15	2	4	5	1	2		1
MFG	53	42	10		1			
MKT	10	6	3	1				
QUA	24	15	9					
SCM	18	3	2	4	3	2	4	
Total	179	81	46	18	13	9	10	2

AFCL: Administration, Finance Controlling & Law

EHS: Environment, Health & Safety

ENG: Engineering

GS: General Services

HRM: Human Resources Management

ICT: Information & Communication Technology

MAI: Maintenance

MFG : Manufacturing

MKT : Marketing & sales

QUA : Quality

SCM: Supply Chain Management

5. Some Concluding Remarks

This paper has proposed an innovative methodology, the Human Capital Map, to manage the redundant staff following corporate downsizing. By focussing on the task/skill-specific component of any given work position, this methodology was applied to a sample of 35 manufacturing companies located in a central Italian region. The Human Capital Map evidenced high potential for job transfers both within and across industry sectors.

In terms of limitations, the project involved a somewhat small set of companies (35) located in a specific geographical area (Abruzzo). Moreover, the companies investigated belong to 7 industrial sectors, all of which operate in the manufacturing area. Further research should accordingly replicate this methodology in other geographical contexts and use larger samples. It would also be of interest to introduce some services companies to the sample, given the increased role played by the service sector in Western economies.

Notwithstanding these limitations, the results obtained seem to confirm the idea that the task-specific human capital perspective may be more useful than that based on the firm-specific vs. general human capital dichotomy. More specifically, the set of knowledge and skills developed by a worker when he/she occupies a specific organizational position within a company appear not to be specific to the company in question, and may indeed be useful for other companies whose job positions require comparable task-specific human capital. Our results also demonstrate that it is possible to create inter-firm worker mobility projects not only within a given industry, but also – *mutatis mutandis* - between differing industrial sectors. Moreover, mobility programs of this nature would facilitate not only the so-called value chain support activities but also the primary activities, such as those regarding maintenance or supply chain management.

With regard to manufacturing activities, although similarities between organizational positions were generally found within the given industry, or between strictly related businesses (Automotive and Plant Engineering), qualitative data collected in the research seem to demonstrate that wider inter-industry mobility may be possible. In this respect, an interesting example was found in the Province of Teramo. As briefly noted earlier in the paper, the local clothing industrial district (Val Vibrata) has for several years been characterized by industrial decline, and consequent staff redundancies, which began before the recent world crisis. Interestingly, this area also boasts a company that produces carbon composite components for high luxury cars. Since some stages of the carbon composite component production process require competencies that overlap with those of the textile industry, various employees who previously worked within the clothing industrial district were re-engaged in the automotive manufacturing company.

Another important point is that the increasing level of process automation in differing industries might be expected

to homogenize the competencies required of production operators. In this respect, striking similarities were found between some production stages in the mechanical and wood industries, such as in the case of operators working in the press department.

The proposed methodology seems therefore to be useful for various applications. First, it enables the planning and implementation of worker mobility processes between companies especially when firms and industries are affected by economic downturn and consequent staff redundancies. Another possible use for the Human Capital Map methodology regards companies operating in the same industry but characterized by seasonal differences. Such companies generally engage casual workers for certain periods (generally 3-4 months) when the production flow is intense. Of interest in this respect is an agreement between a company that operates in the soft drink bottling business and another that produces traditional Christmas and Easter cakes. Since the two companies' seasonal requirements are complementary, and some of the stages of their respective production processes closely resemble each other, the companies agree to “share” their casual workers throughout the year. The employees thus enjoy a stable and year-round job and companies can manage their variable seasonal staff requirements without increasing labour costs. Moreover, the use of what amounts to a permanent workforce obviates the need to implement yearly training programs for new workers.

The results here reported may also prove useful from a work-life balance point of view. It is plausible to assume that during the worker's life cycle, he/she would like to alter the work-family balance. This is an important topic in current theoretical and management debates and in the policy field which still lacks adequate investigation. The proposed methodology could be used to identify companies in which the worker could find different work conditions, such as in the case of shifts. In our sample, for instance, an electronic manufacturer organized the day into two shifts of 12 hours each, instead of the more traditional 3 x 8-hour shifts. In compensation, employees received bonus payments and 4 free days for every 3 working days. The Human Resources Department noted that older employees were generally more susceptible than their younger colleagues to absenteeism. In-depth analysis found that some of the older workers would accept an income reduction in return for a work schedule that better suited their family needs. The same company is widely recognized for its intensive training programs, which make manufacturing operators more qualified than those fulfilling similar roles in other companies. Not surprisingly, the company was interested in planning and implementing an inter-company mobility program that would allow people to move to other companies with little or no need for additional skill-specific human capital.

A final remark concerns jobs that are physically wearying. The Human Capital Map could play a part in the rotation of heavy-duty workers to less demanding occupations prior to

the onset of adverse health effects.

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