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# **HRM in a highly uncertain strategic situation: the case of the electronuclear industry**

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**Abstract:**

The nuclear industry has some specific strategic features that result in a very high level of uncertainty. The demand for new reactors has been declining for more than twenty years, and gains in performance have slowed down during the same period. As a result, at first sight, this technology should be classified as declining in terms of demand and mature in terms of technological life cycle. This situation has important consequences on HRM inside this industry. Especially power plant constructors have had to reduce considerably their personnel numbers. But, this industry also expects a strong revival of demand, which means that it have to preserve its key competences. This paper deals with the management of this paradoxical situation.

**Keywords:** nuclear technology, uncertainty, key competences, strategy, strategic HRM

Human Resource Management can hardly be studied independently of strategy. HRM policies are strongly linked (or at least should be strongly linked) in two ways:

- Human *resources* are means to reach strategic goals. The implementation of strategies, resulting in mergers and acquisitions, sales of subsidiaries, transfers of activities, implementation of new technologies, and so on, have a direct impact on human resources and their management.
- HRM, through its influence on skills and competences, and organisational culture also has an impact on strategy.

Lengnick-Hall and Lengnick-Hall (1988) as well as Hendry and Pettigrew (1990) argue that researchers should recognise this second dimension so that the relations between HRM and strategy should not be studied only from an instrumental perspective, but rather as an interaction process. The resource-based view (RBV) of strategic management that has emerged as a real alternative to the dominant “porterian” paradigm in the 1990s (Prahalad and Hamel; 1994, Teece *et al.*, 1997) can help to root such a perspective in a theoretical framework. Whereas M.Porter’s work emphasizes the role of the firm's environment, the RBV outlines the role of specific resources owned by each firm. Some resources (i.e. those that are rare, valuable, not imitable, not substitutable and not transferable - Barney, 1991) can be sources of sustainable competitive advantage. Specific competences - that HRM may contribute to develop - can therefore be analysed as potential sources of sustainable competitive advantage.

The electronuclear industry appears as worth studying from that point of view. We define “electronuclear industry” as the network of firms involved in the construction, operation (including fuel supply and recycling), maintenance and decommissioning of nuclear power plants. This industry is in a very specific situation: demand for new reactors has dropped in the 1980s and 1990s so that the nuclear technology (or meta-technology, defined as a coherent system combining multiple technologies by Le Duff and Maisseu, 1988) is not only mature but also appears to be a declining one. Nevertheless, it has assets that could be the basis of a demand revival. Moreover, the electronuclear industry is still a “high-tech” industry employing a highly qualified manpower with very specific skills. To our knowledge, this type of situation has not been studied yet. It does not fit, for example, in the typology of Lengnick-Hall and Lengnick-Hall (1988): in the short-term, the electronuclear industry would be considered as a low corporate growth expectations/low organizational readiness (“redirection” situation), but it moves slowly to a low corporate growth expectations/high organizational readiness (“productivity” situation), that would also mean high corporate growth expectations/low organizational readiness (“development”) in case of revival. The situation of totally uncertain corporate growth is not mentioned, although the authors take the relative uncertainty of expectations into account through the flexibility/fit opposition. According to them, too much attention is given to the fit between HRM and strategy, while it should be recognised that a lack of congruence may be necessary during organisation transitions and when organisations have conflicting goals.

The first part of this paper focuses on human resources in this industry. It synthesizes the main results of a survey conducted by the author with the aim of studying the main features of that industry’s human resources at the end of the 1990s. It gives some insights about the internal environment of those firms. The second part develops the specificities of this industry from a strategic point of view. It is therefore more focused on the external environment. In the third and final part the interactions between HRM and strategy in that industry are analysed.

## Human resources in the nuclear industry : some insights

What are the main features of human resources in the electronuclear industry? As surprising as it could seem, not many in depth studies have been made about human resources in that industry at an international level. We have therefore conducted a survey with the help of the World Council of Nuclear Workers. This survey is the basis of the following presentation although some complementary data from national studies and a survey from the European Nuclear Society have been used for triangulation purposes (for details about those complementary studies see Corbel, 2000 and for a presentation of combined data from the Wonuc and ENS surveys, see Corbel and Maisseu, 1998).

### The survey

A questionnaire was sent to 334 companies of the nuclear industry i.e. nuclear power companies (design, construction, decommissioning), electrical utilities operating nuclear power plants, fuel cycle companies, equipment and service firms, and companies involved in nuclear subcontracting. Among the 35 respondents, 28 were utilities operating nuclear power plants. The respondents employed 295,000 persons of which nearly 50,000 in their nuclear activities. If this survey has given us a few insights about the 2 fuel production companies and the 5 engineering firms or research associations that answered the questionnaire, our analysis has focused on the utilities. As some of those utilities are big companies, those 28 respondents operate about the third of the total number of nuclear reactors in the world. All the main technologies used to produce electricity through nuclear plants are represented in the sample (Pressurized Water Reactors - PWR, Boiling Water Reactors - BWR -, Candu, VVR...) as well as all geographic areas. Some biases have been detected from that last point of view: Western Europe is over-represented whereas the United-States and Eastern Europe are under-represented. Complementary data has been used when possible to compensate this weakness.

### Main results

The aim of the survey was to evaluate the economic impact of nuclear industry. Of the 73 questions, not all were concerned directly with human resources. In this paper, we will concentrate on the data concerning HRM.

The most significant results deal with plants in operation. The number of employees working in the power plants owned by the respondents ranges from 362 (156 in a research reactor) to a maximum of 2,847. Nevertheless, only one plant has a staff over 1,500. The distribution is as follows:

Table 1: staff per power plant

Personnel	Number of plants	Percentage
Under 500	11	28.9%
500 to 999	15	39.5%
1000 to 1499	11	28.9%
1500 and over	1	2.6%

One power plant may consists of several nuclear reactors. Therefore, it may be still more significant to analyse the distribution of personnel per reactor (table 2). The average number of employees is 360 (345 in Europe, 545 in the United-States and 280 in Asia in our sample).

Table 2: staff per reactor

Personnel	Number of reactors	Percentage
Under 200	7	8.3%
200 to 399	56	66.7%
400 to 599	10	11.9%
600 to 799	11	13.1%

One first conclusion is that the personnel employed in nuclear stations varies according to the company, the country and the type of reactor. Differences in the organisation of work seems to be the main explanation: significant differences exist between developed countries using roughly the same type of reactors such as France, Japan and the United-States. When compiling different studies, it appears that the number of employees inside nuclear reactors varies from 0.2/mega-watt in operation in Japan to 1.12 in the United-States (0.33 in France). But the number of subcontracting employees compensates partially those differences. They are particularly numerous in Japan as far as our sample is concerned and in France (20,000 persons in that country). Their number can be especially high on one site for specific maintenance operations (e.g. 500 to 700 persons for a reactor outage, over 1,000 for a ten-year inspection, and even 1,700 in one case, for the replacement of steam generators resulting in a capacity gain of 93 MW).

Another interesting insight is that the staff employed in nuclear reactors tends to rise not only in the first years of operation but, although much slower, during all the life of the reactor for 6 power plants out of the 10 that responded to that question. More than half of the respondents were waiting for gains in productivity in the coming years, which may appear as in contradiction to the actual evolution of the staff. Nevertheless, one explanation is the importance of capital productivity, which is at least as important in that industry as labour productivity (improvements in terms of load factor result in higher production with the same capacity, some maintenance operations can also result in capacity gains).

We have also collected some data allowing a more qualitative analysis of jobs. Among them, some seem to us of particular interest. In the 15 companies that answered the series of questions concerning the type of staff employed and that had both nuclear and non nuclear activities, the average proportion of executives and engineers was higher in their nuclear activities (30.3%) than in their non-nuclear activities (25.3% all activities combined). The average age of employees varies from 36 to 44 (the average being just above 40). Staff turnover figures vary a lot from one company to another. The average of the lows and highs given by each companies is 2.4% and 2.8% respectively, which is relatively low and is confirmed by the average seniority of the personnel (from 11 to 19.5 years with an average above 18). Finally, among the 20 respondents to that question, 11 had the same work duration as the average of their country, 6 announced a shorter duration and 3 a longer duration.

Our survey has also given us some information about nuclear plant construction. The main constructors quoted in the sample are Framatome, Westinghouse, General Electric, Hitachi, Toshiba, Siemens, and the AECL (Atomic Energy of Canada Limited). The constructor is from the same country as the utility in almost three-quarter of the cases. And even when the

main constructor is a foreigner, local companies are almost always associated (more than 90% of the answers). In those cases, the number of foreign employees is significantly smaller than the number of national employees. A few dozen persons seems sufficient to organise and manage a comprehensive group. An extreme example mentions the presence of 40 employees of a large international constructor supervising 5,500 nationals.

The construction of a nuclear plant lasts from four to twelve years, with a rising trend over time and an average of seven years in our sample. We have been able to get detailed data about the number of persons employed on a construction site in 8 cases. The average number of persons present on the site ranges from 1,653 to 3,500, with an average of 2,415 persons per site. Personnel peaks reach up to 5,500 in the sample (average peak: 3,864).

## **The situation of the nuclear technology and its consequences on human resources**

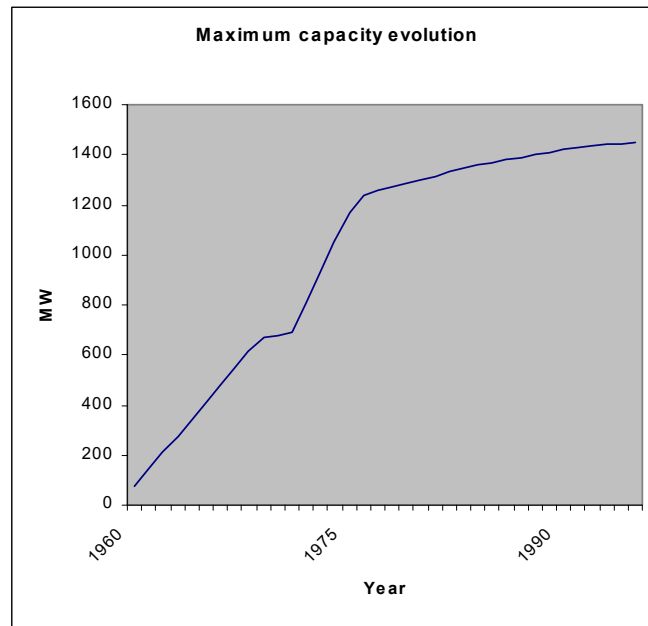
The nuclear industry is in the paradoxical situation of being both mature, with a declining demand, and still a promising technology in many respects. This has important consequences on HRM.

### **A mature technology**

The nuclear technology or meta-technology is far from being new. The first civil nuclear reactor producing electricity was in operation in 1951 at Arco, in the United-States. Gains in performance were very quick at the beginning. The evolution of the capacity of nuclear reactors shows how those gains were important. Whereas that first reactor had a capacity of 0.1 mega-watt, the first Russian reactor had a capacity of 5 MW as soon as 1955. The first commercial power plant was in operation in the UK in 1956. It consisted of four 35 MW reactors. In the first half of the sixties, reactors capacities reached up to 200 MW, and by the end of the seventies 1,000 MW had become a current capacity.

But gains of performance have slowed down since then. If we refer to Foster's S curve (1986), the generation of electricity through nuclear reaction has become a mature technology. Figure 1 shows how the evolution of the maximum capacity reactor in activity follows the pattern of Foster's curve. Time is used as a proxy variable of the cumulated effort in R&D.

Figure 1 : S curve of the nuclear energy generation technology (Corbel, 2003)



Of course other criteria could be applied to measure the gains in performance of that technology, with possibly slightly different results, but it appears as one of the most significant until the nineties. Since then, gains in capacity have become much less a concern for some constructors willing to propose smaller but cheaper reactors (e.g. Westinghouse's AP600 and 1000). It is also true that some promising technological paths such as fast breeder reactors have been abandoned at least partly for political reasons. But even when taking those elements into account, the conclusion is still that the nuclear generation of electricity has become a mature technology.

### **A declining demand**

The demand for new reactors rose quickly, especially in the United-States at the end of the sixties (Goldschmidt, 1980). But the first oil crisis (Debeir et al., 1986) and the rising number of regulations concerning nuclear activities (Martinez-Val and Dominguez, 1995) reversed that trend in the mid-seventies. Some other countries such as France or Japan accelerated their nuclear programmes to compensate for their lack of natural resources. But the Three-Mile Island and Chernobyl accidents, the decrease of oil and gas prices in the eighties, and the rise of "green" political movements led many countries to stop building any nuclear power plant and even to plan to decommission their existing stations. Table 3 shows the evolution of new nuclear plant demand during the nineties. Even if some signs of recovery come from the United-States (Kinnard and Beron, 2000), the trend has not been reversed in the first years of the twenty-first century.

Table 3: evolution of nuclear reactor demand

Year	Number of reactors in operation	Capacity In operation	Number of reactors in construction	Capacity in construction	New construction sites
1992	424	330,651 MW	72	59,720 MW	2
1993	430	337,718 MW	55	44,369 MW	6
1994	432	340,347 MW	48	38,876 MW	
1995	437	343,792 MW	39	32,594 MW	
1996	442	350,964 MW	36	27,928 MW	3
1997	437	351,795 MW	36	36,813 MW	5
1998	434	348,891 MW	36	27,536 MW	

The situation is particularly difficult for companies from western Europe and the United-States as most of the reactors in construction are now located in Asia. This has resulted in job losses among the main nuclear power plant constructors: Framatome, Westinghouse and Siemens (Wagstyl, 1996).

This type of situation: a declining demand for a market based on a mature technology should normally lead to specific strategies aimed to find new ways of ensuring growth, i.e. consolidating within the industry or diversifying into new markets (Anand and Singh, 1997). Some merger & acquisition movements have taken place in this industry, especially in the last five years. BNFL bought Westinghouse in 1998 and Westinghouse acquired ABB two years later. Its main European rivals merged: first Framatome and Siemens' nuclear divisions, and then Framatome with the Cogema. But those movements took place only a long time after the crisis had begun. Moreover, few large actors of this industry have exited the market up to now. We argue that one of the reasons for that is a persistent belief in this industry that the situation is going to improve in the next five to ten years. As Harrigan (1980:600) stated: *“If competitors were strongly committed to being in a particular business and were expecting demand to revitalize, but were uncertain when it would do so, they would be more likely to continue to operate their plants at low capacities for many years rather than sell them, retire them, or otherwise reduce their commitment to the business.”*

### **An important potential of recovery**

The fact is that managers of companies in the nuclear industry have some good reasons to hope for a recovery. The current energetic system based on fossil fuels is neither satisfying in terms of pollution, especially carbon dioxide emissions, nor in terms of geo-political terms (risk of dependence, concentration of resources in risky areas). Despite an actual growth, no new renewable technology has the potential to substitute for fossil fuels today. From that point of view, the absence of direct gas emissions and the relatively diversified resources of uranium are undisputable assets for the nuclear technology.

The potential for recovery is very important. During the first half of the seventies, orders for new reactors peaked at 30 per year. In 1973, 70,000 MW of new capacities were ordered (Debeir et al., 1986). Even if the probability of coming back to such high levels of demand is weak, simply replacing existing capacities as the older nuclear power plants are closing would necessitate significant investments (33,000 MW would have to be replaced in the United-States alone between 2000 and 2014 - MacLachlan, 1995). This is probably the primary reason why incumbents do not exit this market.

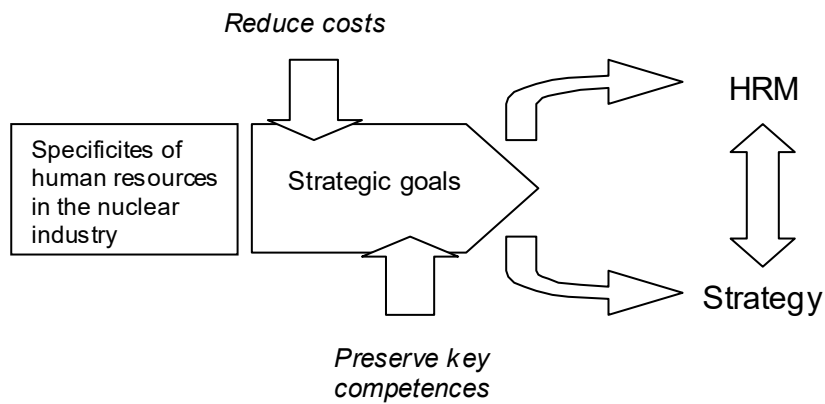
Nevertheless, barriers to such a recovery are still high. Political support, that has become rare after the Three-Mile Island and Chernobyl accidents, is necessary but not sufficient. Another important barrier has risen during the last twenty years: deregulation. The construction of a nuclear power plant usually lasts about ten years. Its operation life may last up to half a century (in the UK, some reactors connected to the grid at the end of the fifties are still in operation), but may be stopped much sooner for economic or political reasons. And after that, the company is still liable for decommissioning the plant for decades. Building a nuclear plant in a very long term investment with a high level of uncertainty in terms of economic results. Deregulation has still risen uncertainty. Market shares and prices are now varying parameters. Financing nuclear power plants therefore becomes increasingly difficult.

As a result, nuclear power plant constructors and, to a lesser extent, fuel-cycle companies and power plant operators have to preserve their key competences to be able to benefit from the potential recovery while reducing their costs. This is especially difficult for plant constructors. Their main competences that can be defined as *“their ability to use high level scientific knowledge in the context of very large scale projects and with very high safety requirements”* may be a source of sustainable competitive advantage (Corbel, 2003). But *“unlike physical assets, which do deteriorate over time, competencies are enhanced as they are applied and shared.”* (Prahalad and Hamel, 1990:82). In other terms, nuclear plant constructors have to find either stations to build or alternative ways to preserve their specific competences. This should lead to specific managerial actions both from a HRM and from a strategic point of view. But as mentioned in the introduction, most existing theoretical models are based on more clearly defined situations. When industry decline is studied (see for example Perry, 1986 for strategic HRM and Lamont *et al.*, 1993 for strategic decision making), it is considered as a definitive decline.

### **A situation demanding strategic action**

Both HRM and strategy will have to deal with the tension between two apparently contradictory goals: reducing costs on the one hand and preserving and enhancing specific competences on the other hand. We show that managing this tension is possible through complementary actions at both HRM and strategic levels. Figure 2 synthesizes our framework of analysis.

Figure 2: the framework of analysis



### HRM actions and their limits

At first sight, the goal of reducing costs and the goal of preserving competences call for very different HRM policies.

The first contradiction concerns recruitment. Reducing costs implies to minimise recruitment. Recruitment in such a context is used only to compensate for departures at key jobs. And even from that point of view, internal recruitment may be used first. At the other extreme, preserving and enhancing competences should lead to recruitment of highly qualified young personnel. Stopping recruitment leads to problems of transfer of knowledge from one generation to another. Long periods without a significant number of new recruitments generates disequilibria in the “population pyramid” of firms. And this problem has become a common concern for human resource managers of industries having experienced deep crises in the last decades. This can be illustrated by the claim of the French automobile producers to be authorised to use simultaneously early retirement and massive recruitment to replace some of their older workers by younger ones at the end of the 1990s. The problem may become particularly important in the nuclear industry as our survey has shown that many firms from this industry had an average staff age above 40.

The second contradiction concerns training. Reducing costs may imply to reduce training budgets, which is clearly in contradiction with competence enhancement policies.

The third one concerns employment policies. Reducing costs should normally lead to layoffs, especially among firms specialised in plant construction that face a significant and durable drop of their activity. But such a policy would lead to hire massively new employees who would not have the same skills as present employees of the company in the case of a demand revival. According to Perry (1986), the cost of layoffs increases with the level of firm-specific skills. In the nuclear industry, industry-specific skills are very high. It is more difficult to evaluate the level of firm-specific skills, but the relatively low number of large firms of this industry in each country implies that unless significant international workforce transfers, industry-specific skills are also often firm-specific. For example, in France, skills concerning the operation of nuclear power plants are specific to EDF.

The fourth one concerns wage policies. Reducing costs implies not to rise pay, and even if possible try to reduce wages. But preserving key competences implies that wages do not pass below some thresholds that would lead highly qualified manpower to leave the firm for other firms of the same industry that would have a different policy or for other industries.

Table 3: a situation calling for contradictory policies

	Reducing costs	Preserving competences
Recruitment	As few as possible	Necessary to ensure knowledge transfer between generations of workers
Training	Reducing training budgets	At least maintaining training budgets
Employment	Downsizing	Preventing massive layoffs
Salaries	No pay rise. If possible, negotiation of wage reduction.	Maintaining wage attractiveness as compared to other industries

How is it possible to manage this tension between two extremes? Our survey gives us some insights about it. If nuclear plant constructors could not avoid to reduce their workforce, the situation of plant operators is different. We have seen that plant managers were waiting for gains in productivity in the following years while sometime announcing slightly increasing staff numbers in the previous years. As we have no argument that would lead us to think that 1997 was an inflexion point from that perspective, we have proposed another explanation, more coherent with other results of our survey such as the evolution of the load factor: those firms may focus more on capital productivity gains than on labour productivity gains. Our survey confirmed that payroll was not the main source of expenses of those companies as it represented between 5 and 25% among the respondents (that had not all only nuclear activities: the same ratio among nuclear plants of our sample was never above 13%). Reducing the cost of investment (for new power plants but also for important maintenance operations) and maximising the use of power stations (by reducing the time of reactor outages for refuelling and maintenance operations) therefore appear as more effective in terms of costs reduction than massive downsizing, while not generating the same problems. And if reducing payroll is not a predominant aim anymore, it becomes possible to ensure the minimal recruitment necessary to equilibrate the population pyramid of the firm and to rise wages when necessary.

Concerning training budgets, firms that responded to that question in our survey reported a ratio training expenditure/sales turnover of 0.4% on average. This ratio rises to 2.7% for individual power plants that responded to that question. Those figures are only indicative as the sample is too small for those figures to be considered to be statistically significant, but they show that the impact of training expenditure cuts on global costs would be only marginal as compared to its impact on competence preservation and enhancement.

The second lever of action lies in work-organisation, which can also be considered as part of HRM (Hendry and Pettigrew, 1990). Organisation of maintenance in the Japanese or French ways appears as more adapted to the situation. In France, about 20,000 employees are distributed among the different power plants according to their needs in terms of maintenance operations. Although most of them work for subcontractors, the fact that EDF is the only nuclear power plant operator in France facilitates such an organisation. The advantage is that teams are not linked with only one plant, allowing for economies of scale. Constituting such nomad teams could be a solution to both reduce cost and preserve competences in countries where maintenance staff belongs to power stations personnel.

Nevertheless, those solutions mainly apply to nuclear plant operators and maintenance firms, much less for nuclear plant constructors. Additional strategic actions are therefore needed.

### **Some suggestions at a strategic level**

Three main competences of the electronuclear industry incumbents have been identified as potential sources of sustainable competitive advantage: technical and scientific knowledge in nuclear physics, chemistry and engineering; risk and quality management; and large project management (Corbel, 2003). In the same paper, two complementary strategies were proposed to preserve those key competences.

The most obvious solution is to go on building a minimum number of nuclear plants. For plant operators, it means that the preservation of competences must be taken into account in their investment choices. According to our survey, most of nuclear plant operators (12 out of 16 respondents to that question) still considered nuclear as one of the main technologies they would give priority in the following years. But most of them have stopped investing in new reactors. Although, it is difficult to imagine an electricity generator investing in new nuclear plants only to preserve its own competences and those of its main suppliers in the field, it could be considered as one of the many factors to take into account in this kind of decision. Concerning nuclear plant constructors, the current situation means that they have to make sacrifices in terms of profitability and in terms of diffusion of their knowledge to have a chance to win one of the few international contracts for new reactors. But, when considered as a way to preserve key competences, it can be seen as a potentially fruitful investment. That kind of strategy has been used by Framatome (now merged with the Cogema) in China. The adaptation of reactors to the new conditions of competition on the electricity supply market could also help to overcome the barriers currently preventing power station operators to invest in new reactors. Proposing smaller reactors, thus reducing construction delays and investment could be a solution. Westinghouse's AP 1000 and AP 600 projects are examples of that kind of efforts to take the new situation into account.

The RBV suggests another approach. Related diversification could be a second solution to be used as a complement or as a substitute to the first one, especially when the company is building no more plants as it is the case of some of the largest firms of that industry. Some studies based on the RBV have explored the relationship between diversification and competences (see for example Markides and Williamson, 1996), but their argument is based on the type of resources that the buyer can gain in the operation, much more than on the way such an operation can be used to preserve existing threaten competences. In the case of the nuclear industry, this diversification would have to use whether the same scientific skills, the same quality and safety management skills or the same large project management skills. For plant constructors, diversification in other nuclear activities less subject to short term variations such as fuel supply and recycling or plant decommissioning could help preserving most of the first type of competences. Diversification in the construction of other kinds of power plants, but also desalination plants (Corbel, 2003) could also be worth studying when taking the preservation of their competences in the field of large project management into account.

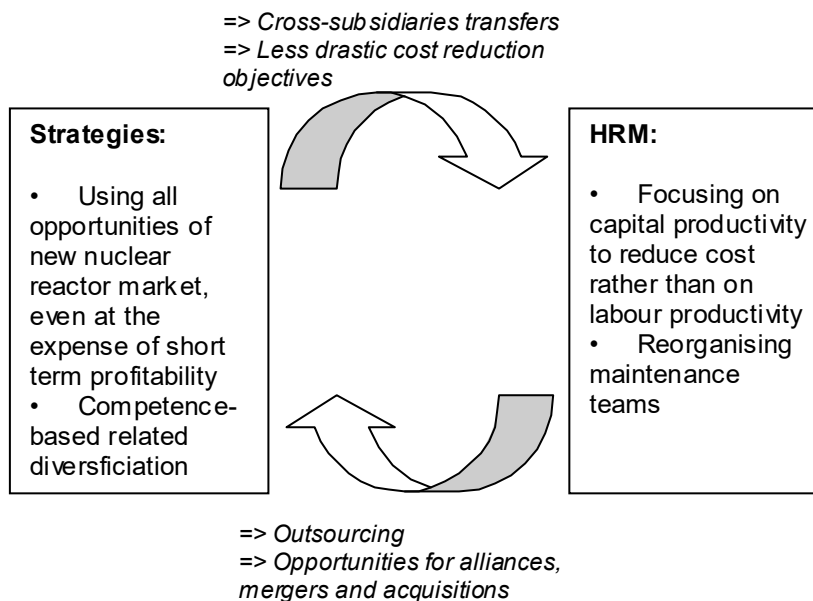
## The articulation between strategy and HRM

Although at first sight the suggested actions at the HRM and at the strategic levels may appear as being different and unrelated, a deeper analysis shows strong interactions between the two.

First, both strategic actions proposed above help to prevent or limit massive layoffs. Related diversification seen as a way to preserve existing competences implies to use cross-subsidiaries transfers to make sure key scientists and engineers will permanently use their skills at a proper level.

Second, changing work-organisation may also change the organisation frontiers. Building multi-plant maintenance teams for example implies at least outsourcing decisions, but may also create or contribute to the creation of alliances among nuclear plant owners or even mergers and acquisition. Cost reduction is generally quoted as the first factor of explanation for that kind of operation (see for example Dizard, 1995), but not always only through economies of scale but also through mutual organisational learning (Willamson, 1997).

**Figure 4: interactions between HRM and strategy**



## Conclusion

The electronuclear industry clearly appears as an interesting field of study as far as the interactions between strategy and HRM are concerned. The declining demand for new reactors has had direct consequences on employment, especially among firms specialised in the construction of nuclear power plants. All the firms of the industry are also concerned with the risk of losing the competences accumulated over time both at the individual and at the organisational levels.

The actual and suggested strategic and HRM actions that companies confronted to that situation could implement are shown to be interrelated although they could appear as different in content and in nature. Of course, strategic decisions have direct consequences on HRM.

HRM actions can even be vital for strategies to be successful: competence related diversification cannot reach its goal of preserving competences if proper policies of cross-subsidiary transfers are not implemented. But, HRM decisions such as work reorganisation can also have a strategic impact as it can modify the firm's frontiers (outsourcing), and can even contribute to create opportunities for alliances, mergers or acquisitions.

Of course, this study suffers from some limitations. First, the empirical data used was not designed for such an analysis. Elaborating a new questionnaire capitalising on the first one but also taking the new questions raised by this analysis into account will be the next step of our research in that field. Second, the strategic and HRM actions presented here and their interrelations are a mix of actually used actions and of suggestions from the author. Those suggestions should be confronted to the reactions of managers from this industry in order to be validated, enriched and/or modified. Some questions will be added to the new questionnaire for that purpose, but in-depth discussions with managers seems to us necessary as a complementary tool.

This analysis may also be related to other research questions directly linked to that of the interactions between HRM and strategy. Since the emergence of the RBV in the strategic management literature, strategy and HRM have a common central concept: competence. But the sense of competence in HRM and strategy is different. On the one hand, the concept is directly related to the individual whereas, on the other hand, strategy is interested in organisational competences. If different, those concepts are interrelated: from where organisational competences could come if not from its personnel competences? But these interrelations are complex as organisational competences are different from the simple aggregation of individual competences. The specific situation of the nuclear industry and the concerns it creates among this industry's managers may be an opportunity to improve our knowledge of those interrelations.

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