Individual Coursework Submission Form

Specialist Masters Programme

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Individual Coursework

SMM750 Digital Technologies and Value Creation

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Introduction

This report addresses the restructuring process at Société Française de Biotechnologie (SFB) following its merger with Big American Pharmaceuticals (BAP). As part of the integration, BAP plans to offer rupture conventionnelle collective (RCC) agreements to selected groups of SFB employees. The restructuring strategy is grounded in a predict-and-optimize approach. Using historical data and insights from previous office closures, I develop a predictive model to estimate the likelihood of an employee accepting an RCC offer. Employees are grouped based on non-discriminatory criteria and factors aligned with company culture and financial incentives. To support BAP's decision-making, I implement an optimization model using Excel Solver. This model helps identify the most suitable employee groups to target with RCC offers, balancing expected participation with cost and operational constraints.

Grouping

I define seven employee groups, ensuring that no discriminatory features, such as age, gender, or marital status, are used as grouping criteria. These characteristics are protected under EU legislation (European Union 2000) and corresponding national laws (French Business Law 2024). The grouping approach is guided by factors that aim to preserve company culture, maximize financial benefit, and identify employees who are likely to accept an RCC offer based on observable characteristics, rather than the predicted likelihood produced by the model.

- **At-Risk Low Performers (114 individuals)**: This group includes employees who are less satisfied in their roles and occupy junior positions, suggesting they may have limited impact on core operations and may be more open to exiting.
- **Burnout (34)**: Employees in this group show signs of being overworked or fatigued, often working overtime while struggling with work-life balance. These conditions can lead to disengagement and a higher willingness to accept an exit offer.
- **Junior High-Turnover (24)**: These individuals are early in their careers, and frequently switch jobs. Their lower organizational attachment makes them more likely to leave voluntarily.

- **Unengaged but Trained (37)**: Despite recent training and development efforts, employees in this group remain unengaged and dissatisfied. This signals a poor return on investment and limited alignment with the company's future direction.

- **Bad Job Embeddedness (15)**: Employees in this group have weaker social or relational ties within the organization and face challenges balancing work and personal life. These factors reduce their psychological cost of leaving.

- **Early Career Uncommitted (13)**: These employees have been with the company for a short to moderate time and already show low motivation and involvement, suggesting they are not strongly integrated into their roles or teams.

- **Compensation Imbalance (30)**: This group consists of employees who earn relatively high salaries but would receive a comparatively low RCC payout due to limited tenure. Offering exits to these individuals can be financially advantageous for the company.

Following the implementation of the grouping strategy, I assess the average values of protected characteristics, namely age, gender, and marital status, to verify the absence of unintended bias. Although the groups are constructed exclusively using non-discriminatory features, this validation step ensures that indirect disparities have not emerged. ***Table 1*** shows no substantial deviations in these characteristics across groups, indicating that the approach upholds fairness and complies with relevant legal and ethical standards.
With the exception of the "At-Risk Low Performers" group, all other groups represent a moderate to small proportion of the total workforce (each comprising less than 10% of employees). Smaller group sizes provide greater flexibility in the optimization process, allowing constraints to be satisfied more precisely while maximizing the objective function. However, their average values may be less reliable or harder to interpret compared to larger groups due to the limited number of observations.

Group	**Age**	**Male (%)**	**Married (%)**	**Single (%)**
All Employees	38.00	0.60	0.44	0.34
At-Risk Low Performers	36.75	0.57	0.46	0.34
Burnout	40.53	0.56	0.44	0.24
Junior High-Churn Roles	39.75	0.58	0.46	0.21
Unengaged but Trained	36.35	0.59	0.46	0.30
Bad Job Embedding	35.27	0.47	0.33	0.47
Early Career Uncommitted	32.85	0.62	0.46	0.23
Compensation Imbalance	36.67	0.57	0.47	0.40

Table 1: Mean Values for Key Features by Group

Optimization Model (Excel Solver)

To account for the fact that individuals may belong to multiple groups, I separate the optimization model into two sheets: *opt*, which contains the group-level decision variables and model constraints, and *data*, which operates at the individual level. The *data* sheet ensures that each employee is only counted once, provided that at least one of their assigned groups receives an offer. This structure allows for accurate calculation of outcomes such as the total number of departing employees by department, total compensation costs (The RCC offer is calculated as base compensation plus an additional three months of salary, in line with precedent from the previous closure (Exhibit A2, (Hall, Gulati, and Ovchinnikov 2021))), and salary cost reductions, each weighted by the likelihood that the employee accepts the offer. I use the *Evolutionary* Solver due to nested `IF` formulas in the *data* sheet, which prevent the use of linear solving methods. I adopt this grouping approach because enforcing distinct, non-overlapping groups would limit the flexibility and nuance of the group definitions, which are intentionally based on structural and behavioral patterns. Allowing overlap not only reflects the complexity of real employee profiles but also increases financial efficiency by enabling the optimizer to select the most cost-effective combinations across multiple criteria. Furthermore, using individual-level likelihoods rather than relying on group means enables a more realistic and precise estimation of both financial impact and headcount change.

The *opt* sheet defines each group as a binary decision variable, indicating whether an RCC offer is made to that group (***Table 2***). The optimization is subject to several constraints: each department must retain at least 80% of its original workforce, a minimum of 40 employees accept the offer, and the solution must generate at least 3,000,000 euros in annual salary cost savings. A data summary section within the sheet reports key outcome metrics (***Table 3***), including the estimated percentage of remaining employees by department, the total number of employees expected to accept offers, and the projected salary cost savings. The decision variables indicate that offers are made to three groups: *Burnout*, *Junior High-Turnover*, and *Compensation Imbalance*. As a result, approximately 46 employees are expected to leave, generating 3 million euros in salary savings at a **severance cost** of around 1 million euros (***Table 4***). Departmental constraints are respected, with each retaining close to 90% of their original workforce. Selecting these groups ensures a balance between financially motivated choices and those that minimize disruption to the existing company culture. There is a trade-off between the total costs of severance and the annual salary savings. Although slightly more employees are expected to leave than required, resulting in higher compensation costs, the inclusion of the *Compensation Imbalance* group yields better financial efficiency relative to any other group considered individually.

Group	At-Risk	Burnout	High-Turn.	Unengaged	Embed.	Uncommit.	Imbalance
Offer (0/1)	0	1	1	0	0	0	1

Table 2: Binary Decision Variables for Groups

Metric	**Value**
R&D remaining %	0.90
Sales remaining %	0.89
HR remaining %	0.90
Employees leaving	46.91
Salary cut (€)	3,000,148.65

Table 3: Summary Metrics

Objective	**Value (€)**
Severance Cost Total	1,010,860.80

Table 4: Estimated Severance Cost

Strengths & Limitations

The predict-and-optimize approach in this project offers a practical way to estimate the effects of RCC offers across different employee groups. It allows for quick scenario testing under realistic constraints and highlights trade-offs between cost savings, headcount reduction, and group selection. While not definitive, it serves as a strong starting point for shaping restructuring decisions. Also, managing the optimization dynamically on an individual level provides the flexibility to modify groups at any time and to any extent.

However, the reliability of this approach depends heavily on the accuracy of the underlying prediction model. While the group definitions are based on company-structure-related features and do not include the predicted likelihood of accepting an RCC offer, the optimization step uses these predictions to estimate participation and financial outcomes. This means that even if the group selection is structurally sound, the results are only as accurate as the model's ability to estimate who is likely to accept an offer. Any bias or inaccuracy in the prediction model will directly affect the optimization output.

Another limitation lies in the fact that employees are represented solely through HR data. While this allows for a systematic analysis, it does not capture informal influence, recent hiring strategy, or future potential, factors that may be highly relevant for RCC decisions. For instance, including the cost-efficient *Compensation Imbalance* group improves the financial outcome, but it could also lead to the departure of newly recruited talent hired for fresh expertise.

Overall, the approach offers a structured way to approximate potential outcomes and support decision-making. However, it should be viewed as a decision-support tool rather than a definitive solution. Final decisions should be made by those with contextual and qualitative insight, using this model as one input among others.

References

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