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Working Party on Small and Medium-Sized Enterprises and Entrepreneurship

**BEST PRACTICE POLICIES FOR SMEs: COUNTRY PRESENTATIONS ON SME PROGRAMME
EVALUATIONS**

**INFORMATIONAL INTERMEDIATION: A TOOL FOR EVALUATING THE CAPACITY OF SMEs
TO ACCESS FINANCING**

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**INFORMATIONAL INTERMEDIATION:
A TOOL FOR EVALUATING THE CAPACITY
OF SMEs TO ACCESS FINANCING**

1. While this paper describes a method of evaluating a policy used in France for helping SMEs, its broader purpose is to show how such a tool can serve to target assistance and financing to small businesses more effectively. Still at the experimental stage, this method of evaluating the capacity of small businesses to raise financing from their various outside partners could in time offer an instrument that, if widely used, might enhance the transparency of small businesses and thereby improve their positioning and their chances for survival. A problem generally faced by such firms, and one that most government efforts to reform financing channels and modalities are intended to address, is the lack of confidence they inspire. Not only do banks and financing agencies tend to ration credit to such firms but suppliers are also many of them, and even official assistance providers, intent on maximising the effectiveness of their programmes, try to avoid spreading too thinly their limited resources among enterprises whose survival is far from assured.

2. In itself, this rationing situation is nothing new. It is a source of constant complaints in France and in most OECD countries. At the European level, the clearest manifestation of the problem is to be found in the reports of the Round Tables of Bankers and SMEs organised by DG Enterprise since 1993. In fact, however, most of the recommendations and suggestions contained in the various studies for facilitating SME access to financing focus on improving existing financing channels, or even creating new channels reserved for "vulnerable" SMEs. Such measures include the creation of advisory services and networks devoted exclusively to SMEs, promotional campaigns to make small businesses aware of the kinds of financing available to them, more and better surety and guarantee mechanisms, and insistence on "fair practices" in financing decisions so that firms will better understand the decision-making models in use, and will be encouraged to conform to them and so enhance their chances of obtaining financing.

3. While previous efforts have helped some small firms to navigate existing financing channels, the basic capacity of those channels to accommodate firms of this kind has not changed significantly. Evidence of this fact can be found in the many demands by business groups and the many tools developed to compensate for the shortage of equity and external resources that constrains the growth of small firms and threatens their survival. While developing compensatory tools is seen as a promising solution and one that will help improve the performance of firms, it is essentially a corrective approach and is unlikely to modify the logic underlying the bank-small business relationship. Trends in the English-speaking countries, in particular, are running in the opposite direction in the sense that the client relationship is deteriorating, and small businesses are increasingly treated like private individuals. For this reason, they have largely been abandoned by corporate finance departments and have been relegated to the personal loan offices that rely on mass processing methods based on scoring tables that perpetuate and exacerbate the confusion between the business and the head of the firm or entrepreneur.

4. Thus, in light of these trends and with a view to providing an instrument for improving the survival rate of small businesses, the Direction des Entreprises Commerciales, Artisanales et des Services of the French Ministry of Economic Affairs, Finance and Industry undertook a study to promote the idea of informational mediation as a means for enhancing the capacity of small firms to mobilise financing. After discussing the background and concept of informational intermediation (section 1), we shall look at some

modalities for making it operational and useful in the bank-borrower relationship (section 2) and the procedures to be followed for making such a tool credible as a mutually agreed confidence indicator (section 3).

1. The concept of informational intermediation

5. It is a known fact that small businesses have difficulty in obtaining credit. The reasons lie, at least in part, in the cost of processing small loans, the unglamorous nature of working with this client segment, and the weakness of the guarantees that can be offered. "Guarantees" should be understood in its broad meaning: it refers to real assets and security, of course, but also, and even more importantly, to the borrower's capacity to produce relevant information and the lender's ability to get it. "Relevant" here means that the information will be useful for risk management purposes and, more generally, that it will demonstrate the entrepreneur's capacity to anticipate the development of trends in his business. It would seem timely, therefore, to examine the possibility of introducing a method of external evaluation for this class of borrower.

6. It would seem in fact that the best way to reconcile the financing needs of small businesses with the security expectations of banks would be to examine the potential of a specific intermediary structure that would have specialised expertise and fill a particular niche in the credit market. A specialised agency that could provide sound and validated information for these purposes and that could also benefit from the learning curve would seem an excellent way to get around the financial constraints observed. First, because there would be greater transparency surrounding potential clients. Second, because such an agency dedicated to small businesses would give the banking system a single and therefore homogeneous point of reference. Finally, because learning through practice and experimentation, which such an approach presupposes, will be made easier by concentrating codified knowledge (which can be stored electronically) together with tacit knowledge (which is based on experience and cannot be exchanged in the course of the normal market relations) within the same agency.

1.1. Shareable knowledge

7. From a generic viewpoint, the intermediation function involves putting knowledge, know-how, methods, techniques and tools to use for conducting business and establishing the associated relationship. In economic activity, this intermediation function can take various forms (financial, political, commercial) but the most important aspect for the small-business lending segment is informational mediation of a kind that will ensure a proper flow of information and knowledge. This points to a mission with three goals: providing access, refining, and providing benchmarks:

- Access for businesses and all economic players to the information and knowledge needed in their respective economic actions.
- Refining the knowledge and information acquired so as to move from general data to an intellectual tool for resolving concrete problems facing the lender or investor.
- Constant updating of information on the borrower's overall activity so that the players involved can position themselves appropriately.

8. It involves, then, a continuous process of transforming generic knowledge and information into operational tools and solutions for economic players, as well as producing a continuous overview (we

might call it an up-to-date map) of the firm within its environment. To what extent would such a function improve the capacity of small businesses to obtain financing?

9. For a lender to enter into a credit relationship he must have a means of evaluating and assessing the risk, which we might call the “enterprise risk”, in order both to distinguish it from the credit risk and to stress the purpose of the relationship, which is to enable the future creation of wealth. In this respect, “credit” will retain its original meaning -- it will be viewed as a wager on the future success of a productive activity. Within this notion of a commitment to the future we can identify two distinct forms of enterprise risk:

- The insolvency risk, to which banks and suppliers are no doubt the most sensitive, is the reverse side of the accumulation effort, which requires financing, in particular external and most often bank financing, and makes it possible to manage the competitiveness risk by providing the means to improve the firm’s competitive position.
- The risk of losing competitiveness is less often considered because it is difficult to assign it a probability; it can be viewed as the downside of efforts to maintain sound financial health by foregoing needed investment in order to restore or maintain a certain level of solvency.

10. While in the case of widely traded firms the rating agencies make all of this information available for portfolio arbitrage and investment decisions, data relating to competitiveness risk tend to be excluded from the field of analysis for small-business risk. Making such data available would represent a real boost for developing this segment of the industrial fabric, in light of evidence (Paranque *et al.*, 1996) that small businesses are doubly handicapped when it comes to financing:

- The aversion that they inspire stems less from concerns over their profitability than from doubts about their survival, and this issue relates directly to their ability to produce information on their likely durability. We may say that that the “small-business risk” refers in effect to the additional cost of acquiring information on them, compared to large firms that are subject to the demands of the financial markets. An informational intermediary could thus play a key role in collecting, organising and disseminating information in the form of knowledge that can be shared to enhance players’ forecasting and hence their forward planning capabilities.
- The growth and the liberalisation of financial markets have made performance more volatile, and consequently the banks, and lending institutions generally, are confronted by a “time lag” between the pace of those markets and that of firms’ real activity. Lenders react to the cost of this lag either by increasing their spread or by being more selective about the loans they make. This selectivity affects both the volume and the nature of lending (short-term as opposed to medium or long-term) and/or the cost of the loan. Small businesses, then, are particularly handicapped in comparison to other firms, less because their solvency risk is unduly high (Delbreil *et al.*, 2000) than because lenders and borrowers are unable to communicate on the basis of shared information (Belletante and Levratto, 1995). Here again, an informational intermediary could help enhance the transparency of this class of businesses.

1.2. Diversity as a precondition

11. Recognising diversity is a challenge for standard economic analysis, the mechanistic foundations of which are much better suited to the idea of homogeneity (Belletante, Levratto, Paranque, 2001). The impossibility of achieving an optimum in the context of radical uncertainty has frequently been

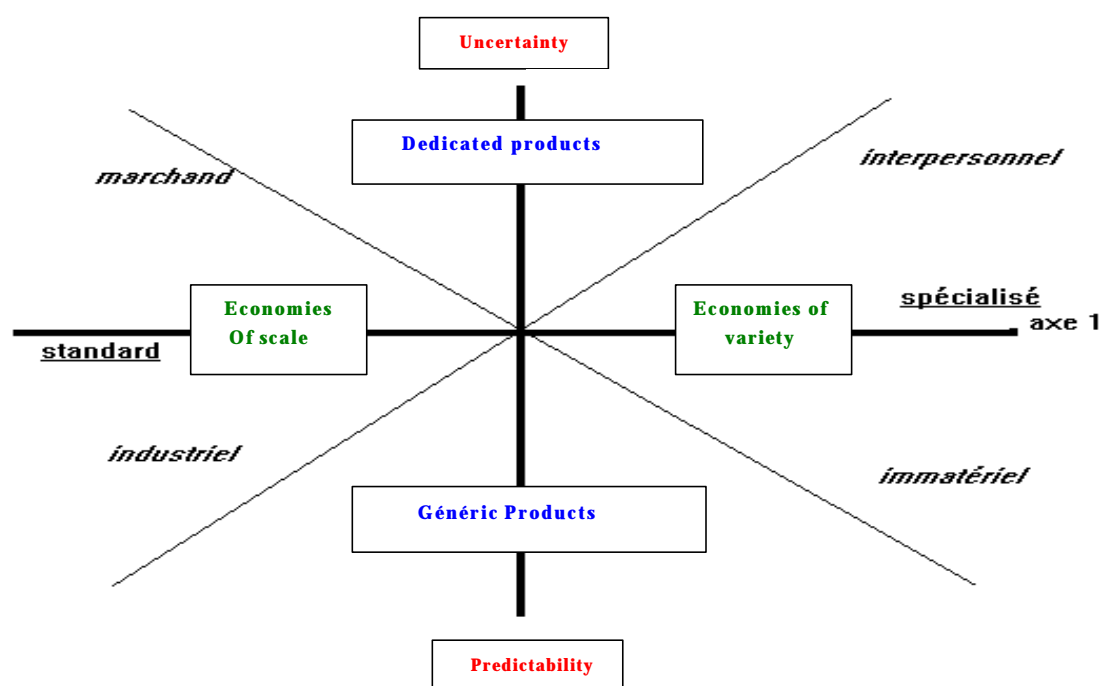
demonstrated, and so analysing the process of co-ordination among players in the market system requires a new theoretical framework, the theory of conventions. Studies under the heading "conventions theory" address many fields in the social sciences: sociology, economics, management (E. Dosse, 1995). Conventions theory had its origins in attempts to overcome the limits of standard economic theory (O. Favereau, 1989) through a theoretical framework that is not limited in its analysis to modes of co-ordinating collective action, i.e. the market and the firm, and that instead seeks to place modes of co-ordination in a broader social setting consisting of collective knowledge, standards and conventions.

12. The theory of conventions allows us to establish a link between agents' calculations and the rules governing those calculations. In fact, while standard and extended standard economic theories (O. Favereau, 1989) regard these rules as exogenous to individual economic behaviour, the theory of conventions turns these rules into tools, into collective cognitive devices, as its principal target of study. Various schools recognise that there are many forms of co-ordinating collective action, but the origin of this diversity differs according to the authors. While for L. Boltanski and L. Thévenot (1987, 1991) it relies on the existence of "cities", themselves the product of political philosophy, for F. Eymard-Duvernay (1986, 1989, 1994) and for R. Salais (1993, 1994) the plurality of co-ordination modes is linked to uncertainty over the identity of the goods exchanged. We shall be guided here by the concept of this last author, whose notion of uncertainty is broader and relates not only to goods but also to the future and to the action of economic agents.

13. Like other writers, Salais identifies four generic conventions expressed in the form of four worlds of production, according to which breakdown a firm, regardless of its size and its activity, can be positioned on a graph with two axes representing the nature of the product manufactured (generic or dedicated) and the production mode adopted (specialised or standardised) (Salais and Storper, 1993). According to the first dimension, generic products are anonymous products in terms of their destination and are defined without reference to people (a new molecule, word processor etc.), while dedicated products correspond to a particular segment of demand and/or to individualised demands (lace for the fashion industry, machining of specialised parts, creation of a software package). According to the second dimension, production is standard if it does not require any specific skill on the part of employees (standardised construction of wooden furniture, for example) and it is considered specialised when each person contributes his own know-how and skills to it (the work of carpenters or cabinetmakers). Parallel to these two dimensions, the authors consider a third set of opposites concerning the state of the market: this may be predictable or uncertain. In the first case, firms would use statistics based on observation. In the second case, given the specificity of their own products, firms cannot predict all the characteristics of demand on the basis of statistics: the decision-making process must then be based on judgment¹. Consequently, the degree of market uncertainty has an impact on the actions of the firm (in production, sales etc.).

14. The combination of the first two axes defined in this way - standardised/specialised production processes and generic/dedicated products, respectively - gives rise to four possible worlds of production: the industrial world, the market world, the interpersonal world and the intangible world or that of intellectual resources. These worlds of production can be viewed as spaces of consistency between the nature of products, that of the market and the operating mode of the firm, i.e. its approach to handling uncertainty and positioning itself within its environment. The four worlds are depicted graphically below:

1. From a theoretical viewpoint, this approach to uncertainty relies on the distinction drawn by Knight (1921) between risk and uncertainty.



15. Every organisation, in light of its external constraints and its internally defined structures, can be subsumed under one or other of the following four models:

- **The interpersonal world** is the world of dedicated products made through a specialised process. Product manufacture depends on the specialised skills and know-how of individuals or firms, matched against the needs of specific customers. The conventions therefore construct from personal relationships among economic agents whose identity is known to each other. This world applies essentially to trades-based activities and, more generally, firms producing products with a high personal service content or making specialised equipment designed to meet the needs of another producer. In this world, firms are subject to a major flexibility constraint, given the specificity of their products and the dedicated nature of demand. Investment of intellectual resources is also considerable.
- **The market world** designates products made according to the standardisation convention, designed to meet a particular demand: this is the world of standard products, but they are dedicated to a defined customer. Activities are co-ordinated by the demands of the buyer. He speaks to producers in the language of standardisation, which objectivises his needs in the eyes of others. The few producers who can meet this demand compete with each other on the basis of price and speed of delivery. In this world, great flexibility is needed to respond to customers' shifting demands.
- **The industrial world** is familiar to us as the world of mass production, destined for large markets consisting of buyers who are treated as anonymous. Its standard and generic products are consistent with an approach to economic development based on maximising macroeconomic growth, a workforce that relies on an objective description of labour, and mass consumption. Industrial standardisation and market predictability make it possible to plan, to objectivise economic risk in physical equipment, in other words to institute economic co-ordination based on the mediation of objects. Competition is on the basis of price, and long-term investment is needed to achieve economies of scale.

- **The world of intellectual resources** (the intangible world) is the world where new technologies and new families of products are conceived and created and the needs they meet are defined. It corresponds to the manufacture of specialised and generic products. This world finds new properties and uses for existing objects. In doing so, it develops general knowledge rather than specialised knowledge, which would be limited to a particular field of application. The tension between novelty and its acceptance as novelty is a central theme, and co-ordination relies on methodological rules of a scientific nature.

16. The rationale of worlds of production is based on the following arguments: first, performance evaluation relies on the diversity of firms. This approach goes beyond the traditional ones that are cast in terms of "sectors", and focuses on the nature of products and their diversity. In other words the specificity of products and productive organisation play a central role in the actions taken by the firm. Secondly, it pays particular attention to the uncertainty facing the firm. On one hand, the analysis captures the nature of this uncertainty. On the other hand, uncertainty is seen not as an unfortunate fact of life but as a motive for action, since it generates different behaviour on the part of firms. A firm's capacity to handle uncertainty is a determinant of its competitiveness. Third, this approach takes a global view of the firm and its environment (for more on these arguments, see B. Paraque *et al.*, 1999).

2. An operational tool

17. We start here from the hypothesis that, in the bank-small business relationship, while project quality is the most important consideration when it comes to credit risk, the enterprise risk must be analysed in terms that go well beyond the likelihood of default and must therefore be viewed in a broader context. There are several reasons for this:

- Empirical studies of firms after they were introduced to the *second marché* [the "second market" of the Paris Stock Exchange, for junior and unlisted stocks] show the influence that the quality of available information can have not only on financing conditions but also on the cost of bank debt (Belletante, Levratto and Paraque, 2001). The impact on the modalities of bank financing caused by the disclosure of private information when the firm is not quoted on the market can be transposed to the case of the bank-small business relationship. It would seem that the potential customer's lack of transparency is taken as a negative signal by the lender who, as an external agent, is unable to determine whether the poor quality of the information disclosed reflects opportunism or simply a lack of competence on the part of the firm.
- The analysis of business failures (Combiere and Blazy, 1998) shows a variety of causes: 44.5% are due to insurmountable marketing problems, 43% to financing problems, and 22% to excessive operating costs. Early warning of these elements will not necessarily show up in the investment project analysis: they can only be detected through a comprehensive study of the unit.
- A comprehensive analysis is more likely to be welcomed by markets. A systemic analysis of the firm is now regarded as the only relevant approach among finance professionals who, discarding the tradition of standard financial analysis, recognise that among firms with seemingly sound performances there can be major differences in financial structure, even if that structure is incapable by itself of explaining the performance of the firm.
- In a small-scale organisation that is highly integrated, an investment project may well affect the firm's overall performance. The soundness of its organisation, its position in the market,

the compatibility of the firm with its environment are therefore key elements in determining the likelihood of repayment (Belletante and Levratto, 1995). And although this variable is a key consideration for the lender, it can only be appreciated through a comprehensive analysis of the firm that goes beyond the simple evaluation of its investment strategy.

18. For all these reasons, the proposed evaluation focuses on the firm. Our approach is thus consistent with the idea of "global competitiveness" put forth by J-C. Larréché (2000) who, in annual studies conducted since 1997 for INSEAD on a sample of 309 large international corporations, shows that there is no single profile of a successful business, but that adaptability to their world of production constitutes one of the key conditions for the survival of manufacturing and service units.

2.1. *The challenge: improving the relationship between small businesses and lenders*

19. Before considering the best tools for reaching this objective, it is worthwhile discussing what needs to be built into the signal in order to meet the expectations and needs of loan officers²:

- **Quality of the application:** this purely formal dimension relates to the entrepreneur's capacity to follow the rules in presenting his project and highlighting its various aspects.
- **Quality of the borrower:** taking essentially the approach of a recruiter, the loan officer will seek information on the entrepreneur's experience, skills, staff, status and personality.
- **Quality of the financing package:** often cited as a problem for entrepreneurs, this dimension looks essentially at the existence of a financing plan, and its soundness, the statement of needs and the availability of suitable guarantees.
- **Quality of the firm's performance:** this element is assessed against various indicators that rely most frequently on experience (trends in the industry, familiarity with the business etc.).

20. These different aspects should all be covered in the signal about the firm's quality that the informational intermediary transmits to banks and suppliers. In this case the rating or score will not only help to improve communication between the firm and other parties but will also provide the entrepreneur himself a more thorough understanding of the characteristics of his firm. To make them fully transparent these aspects must be grouped into a homogeneous evaluation scheme that will produce a score for each firm, in light of the production world to which it belongs. We may define two broad sets of economic criteria: quantitative and qualitative.

– *Quantitative criteria*

This implies, first, identifying the production model in which the firm operates, using the notion of the consistency of the firm's operations with the nature of its products. Next, on the basis of the production model (standardised or specialised), we determine the profitability model (by the market or by the organisation) and evaluate the firm's performance –favourable or unfavourable – against the ratios of the model concerned.

– *Qualitative criteria*

2. The key elements are drawn from a survey of small-business loan officers as part of the MINEFI-DECAS study referred to earlier.

The intent here is to steer the principal banking practice towards economic analysis by stressing the importance of the nature of products and hence of production models (standardised and specialised).

21. Before an economic analysis of a firm's quality can be undertaken, however, the following two conditions must be met:

- First, the small entrepreneur must be made more aware of the importance of management by calculating the informational score. The score is then understood not only as a homogenous and consistent indicator of the quality of small businesses, but also as a heuristic device. The pedagogical dimension transforms the score into an indicator of quality and a device for achieving that quality.
- Secondly, the informational score can facilitate access to credit if banks agree to relax their financial rules and, more specifically, the amount of guarantees they require. In other words, this means that the banks will reduce the weighting of the financial score in favour of the informational score.

22. What we need, then, is a questionnaire that will cover these two broad groups of variables and relate them to reflect the following elements:

- The world of production to which the firm belongs.
- Its organisation.
- The way it manages its physical, human, technological, informational and financial resources.
- The nature and intensity of competition facing the firm, depending on the markets on which it normally sells.
- Its reputation.

23. The final score derived from this questionnaire will then contain three key elements:

- Information on the world of production to which the firm belongs.
- A study positioning the firm within its environment (measuring positive and negative discrepancies in comparison to similar firms, against the different indicators representative of its world).
- An assessment of the adequacy of the firm's productive, financial and organisational structures in light of the market in which it operates.

24. The next thing is to identify the potential users of these multipurpose scores.

2.2. *At whom is the signal aimed?*

25. In light of the information collected from banks and the needs expressed by entrepreneurs, the notion of the score that we propose here attempts to move beyond the simple credit relationship and to take an approach in which the long-term survival of the firm, and consequently its capacity to mobilise partners,

becomes an essential consideration. If the challenge is to enhance the transparency of a small business through information produced by an intermediary, we may imagine that the intermediary will position itself in relation to three market segments: that of small businesses themselves, that of potential support agencies, and that of banks and surety firms.

2.2.1. *First, the firm*

26. Taking sound advice is seen as an essential condition for success in the life of a firm. Its traditional partners, its auditors, trained in analysing balance sheets and financial ratios, are not equipped to provide advice on how to adjust the firm's financial structure to the production world in which it operates. Under the constraints imposed by current methods, small businesses strive systematically for an orthodox financial structure that in most cases they will find extremely difficult to achieve, since they are not positioned as are the private firms that prepared and implemented these methods.

27. Financial analysis and economic research have highlighted the importance of behaviour in classifying a firm. To achieve this level of knowledge, we must go beyond the picture that accounting data can reveal and introduce both qualitative and prospective or forecasting information into the individual study. The search for tools that can be used to guide the firm is a constant concern for entrepreneurs, and partial solutions are already available (the Bank of France's GEODE system, for example)

28. We may imagine then, that a small business will want to know its score in order to position itself in comparison to similar firms and to evaluate and seek to reduce the gap that separates it from the norm or the benchmark score within its world of production.

29. As with most evaluation systems, the result will belong to the firm that requests it. The incentive to seek a score has two aspects and involves both an internal and an external rationale:

- Internally, the preparation of a business strategy requires instruments for evaluating the product-market match that characterises the firm. Based on quantitative and qualitative criteria, this notion of coherence allows the firm to identify its strengths and weaknesses and take the corrective and preventive actions necessary to improve this factor of coherence. This type of policy is sure to enhance the viability of an economic entity.
- From the external viewpoint, the firm may need to demonstrate its coherence and to do so in a way that will be seen as objective rather than self-serving, as might be the case if they were done internally. This in fact is the objective of any form of the third-party certification. Resorting to an external rating agency that uses a standardised evaluation procedure thus allows the entrepreneur to signal the quality of his business to third parties.

30. With this concept of "branding" the firm and disclosing its score to various partners capable of providing financing in different forms, we come to the very essence of the notion of informational intermediation, which presupposes an independent agency that can produce information intended to enhance the quality of the relationship between a firm and its external partners who, as outsiders, have no access to internal information of a privileged kind (which most small and microenterprises are in any case unable to produce).

2.2.2. *Next, the non-banking partners*

31. The second market segment identified for an intermediation agency consists of official support agencies that are increasingly faced with the question of evaluating the impact of their actions. Eager to

avoid diluting their assistance, without letting the yardstick of solvency dominate their approach, these official supporting agencies can benefit from an evaluation method that allows them to assess the impact that the assistance requested by the firm is likely to have, both directly (by improving the product-market match) and by induction (positioning the firm most successfully in its world and improving its capacity to raise funds). The same is true for venture capital companies, local or regional advisory services and development agencies that are primarily interested in the viability of the jobs created by the firms they finance and, generally, that of the firm's suppliers.

2.2.3. *Finally, the banks and surety companies*

32. In addition to conventional financial analysis and the ratings that are widely used by financial intermediaries, the banks, all of which use credit risk evaluation models, may find it useful to have a supplementary method for evaluating the enterprise risk. Among the range of approaches available, it is bankruptcy that is most often tracked, as can be seen in the pre-eminent role that solvency and indebtedness ratios play in financial analysis and the firmly bank-oriented scores produced by discriminant analyses³, even when they incorporate qualitative variables. Previous studies have shown the importance of enterprise risk, and have stressed that it is more global in nature than the credit risk. Besides evaluating the borrower's bankruptcy risk, lenders and guarantors that work closely with small businesses (BDPME/SOFARIS, SIAGI AND SOCAMA), for whom risk assessment is an essential part of their activity, may find it an advantage to have information on the enterprise risk. These institutions have in fact developed various methods for evaluating project quality:

- SIAGI has offered borrowers a risk prevention service, called SIAGNOSTIC, since January 1, 2000. A financial barometer allows the firm to alert its SIAGNOSTIC advisor and seek help as soon as it detects an abnormal situation.
- SOFARIS.com is an affiliate of SOFARIS that provides online ratings for loans to SMEs and microenterprises, which a bank can use to discover the cost of credit for a borrower with its particular characteristics.

33. It is in these three markets (firms, non-banking organisations and development institutions, and banks) that an informational intermediation agency could be positioned as a way of pooling partial data. Every firm seeking an evaluation would pay a fee that would represent the effective cost of the service, after subtracting its contribution to the database, which would then be used to answer requests from municipalities; they would then be invoiced to make up the gap between the price paid by the firm and the total cost of the evaluation. If it is to be recognised as a useful source of information, its evaluation of a firm's survival prospects would have to be recognised by all players. To ensure this, a standardised manual would have to be prepared for rating firms.

3. **A standardised procedure**

34. The proposed rating is intended to evaluate the quality of a firm in light of its product-market match. To achieve this objective, standardised contents and procedures should be introduced in two stages. The advantage of this approach is that it recognises the notion of diversity, the importance of which was stressed in the first section. Distributing small businesses among different production worlds for rating at a

3. “Thus, in financial analysis, discriminant analysis is used primarily as an early-warning tool for predicting bankruptcy” (Bardos, 2001, page 5).

later stage allows the evaluation to focus on different elements depending on the nature of the enterprise in question, and to avoid the systematic and out-of-context nature of conventional evaluations.

3.1. Identifying the firm's production world

35. The first stage is to identify the worlds of production. This would involve a questionnaire that, if there were sufficient responses, could be used to classify firms among the theoretically defined worlds of production.

36. *Group 0 could be considered as the world of intellectual resources*, embracing firms that demonstrate significant innovations in their major production processes, a focus on custom manufacture, a well-distributed clientele, a significant share of intangible investments (22%) and a high cash flow from operations, suggesting that intellectual resources can be largely self-financed. The relative weakness of product innovation (less than 20%) is probably explained by the small size of firms, which will rarely have the technical means (such as laboratories), the human resources (researchers, engineers) and the financial means (very high investment costs and a recapture horizon rarely less than 8 years) to develop new products.

37. *Group 1 would represent the industrial world*, which is characterised by a high level of physical investment that generally reflects widespread resort to subcontracting based on functional specifications, a high level of indebtedness reflecting the investment effort required of these firms, and a relatively sound economic performance thanks to effects of scale. Not surprisingly, it is in this group that product and process innovation is weakest.

38. *Group 2 would represent the world of interpersonal production*, which aims its dedicated products at a great number of clients with different product-quality demands and exhibits a high degree of product innovation (presumably incremental), a fairly diversified client base (less than 20% of sales to their principal clients) and very significant physical investment. Financial performance is mediocre and profitability is average, reflecting competition from larger-scale units (department stores compared to small merchants, for example) that benefit from a combination of size and economies of scale.

39. *Group 3, finally, would reflect the market world*, where dedicated products are exchanged on a standardised market. Innovation plays little role here, most output is custom-made to meet buyers' demands, and principal clients have relatively little weighting in overall sales. The importance of physical investment in this world probably reflects the significant need for materials for adapting products. This sector is heavily indebted, which, *a priori*, should not occur unless operations generate significant working capital needs.

40. These results, then, although they are established on the basis of very partial and clearly inadequate data, are *a priori* consistent with the theoretical approach developed above.

3.2. Calculating the rating

41. The second stage is to calculate and interpret the rating so that the particular firm can be evaluated against other firms in the same world of production. In this case we recommend the "neural networks" approach, which we shall describe briefly before discussing the results that can be expected from it.

Selecting the samples



The process of preparing a neural network always begins with the choice of samples. This is a crucial stage that will help the designer determine the type of network that is most appropriate to solving his problem. The way in which the sample is presented conditions several elements: the type of network, the number of input nodes or cells, the number of output nodes and the way training, testing and validation must be conducted.

Preparing the samples



We have selected the Standard Multilayer Perceptron for structuring the network. The number of neurons in the hidden layer will be set first at the average of the number of input and output neurons and a computer sweep will attempt to determine the optimal number of neurons in the hidden layer.

Training



Training is the next-to-last step in preparing the neural network. It consists first of calculating optimal weightings of the different links or synapses using a sample. The most widely used method is back-propagation: we enter values in the input nodes and in light of the output error obtained (the difference between the calculated output and the expected output) we correct the weightings of the links. This cycle is repeated until the error attains its minimum value, without “overtraining” the network to the point that it loses its capacity for generalisation. This is a very time-consuming process, and there are in fact other methods for optimising training, such as “quickprop”. Back-propagation remains however the most commonly used method, and we have selected it here because it is the most refined.

Validation

Once the network is calculated, we must conduct tests to verify that the network reacts as it should: this is the validation step. We select a portion of the sample that was reserved for training and use it as a validation set. Validation will give us an error rate, based on empirical data, which will indicate the reliability of the system.

42. We may envision different scales of information:
- A *global* scale, which is a synthetic representation of the quality of the firm, comparable to agency ratings. It is based on the surface or overall shape of the rosette.
 - A *categorical* scale, based on analysing observable deviations along each of the cursors that make up the rosette. It highlights the strengths and weaknesses of the firm compared to the characteristic standard for its world.

- A *detailed* level, which in effect represents the pedagogical objective. To the extent that each of the variables of the rosette represents a set of characteristics, we can return to the base data and related information to determine, first, where the deviations originated and, second, what should be done to achieve the standards of the production world in question.

4. Conclusion

43. The production of ratings or scores can contribute to the growth and survival of small businesses by improving their capacity to communicate with their financial environment. Taking a global approach to the firm and focusing on the fit between its internal organisation and its external market, the evaluation method proposed here supplements conventional default risk analysis by assessing the firm's durability. In doing this, we have found it useful to apply the notion of diversity inherent in the concept of worlds of production, which recognises from the outset that small businesses, by their very nature, may have many different forms of organisation and relationships with customers and suppliers.

44. From there on it is a question of statistical processing. Faced with the problem of processing large amounts of data, and anxious to avoid imposing a deterministic view of small business that would take us back to the notion of the "optimal structure" of a firm, we have had to seek a method that can handle the technical difficulties and is consistent with theoretical expectations. The unsupervised nature of Kehonen's self-organising maps and networks appear to meet our needs fully and have produced results that are not only statistically robust but also satisfactory in terms of the underlying economic analysis. The next step will be to apply them to a broader database and then to combine the two stages (distribution among worlds of production and calculation of the rating) into a single software application.

TECHNICAL ANNEX. FORMAL PROCEDURE FOR PREPARING THE RATING

1. Identifying production worlds

1. In the classification stage the original database must be broken down into smaller groups with more homogeneous features. If the database used for the classification is sufficiently large, the classification will yield a typology of firms. For this, we have selected the Self-Organising Maps (SOM) method. Conventional ranking methods, while they may have produced good results, experience a significant failure rate as soon as we deviate from the optimal conditions offered by compact and isolated groups. SOMs constitute a kind of neural network, known as Kehonen networks, the main feature of which is that they can take account of spatial or temporal continuity properties. This type of network relies on a multidirectional propagation dynamic with strong interactions between neurons in the same vicinity. These networks emerged from the work of Fausett (1994) and Kehonen (1995). They are widely used in data analysis because they allow for two-dimensional mapping and recognising groups within sets of data. SOMs are appropriate for dealing with problems that have a spatial and/or temporal dimension. For example, EDF has used networks of this kind to classify energy consumption series. This classification can improve consumption models by adapting them specifically to each class of homogeneous series. (Cf. F. Gardes, P. Gaubert and P. Rousset, 1996).

2. Our pre-testing was done on the basis of anonymous data taken from a database selected by EM Lyon. The sample contains 459 SMEs with fewer than 50 employees and annual sales of less than €7 million. For each firm, we have the following information available:

Financial:

Financial debt/net worth

Gross operating margin/sales less taxes

Financial debt/cash flow from operations

Physical investment/physical and intangible investment

Working capital requirements/net worth + financial debt

Cash flow from operations/net worth

Qualitative:

Number of competitors in principal activity (multiple-choice)

Market share for new products over last two years (multiple-choice).

Production process innovations over last two years (multiple-choice)

Ratio of customised to standard manufacture (multiple-choice).

Percentage of sales to principal customers.

NAF [Nomenclature d'Activité Française] code.

3. The "financial" variables reveal a firm's behaviour and performance, using standard financial analysis tools. The "qualitative" variables provide a closer picture of the firm. They are important in two ways: first, they provide a scaled-down picture of the overall business, something that is relatively new, and second, they help to highlight the shortcomings of using financial analysis alone as a tool for appreciating the nature and quality of the firm.

4. Two steps are needed to validate the software approach on the basis of test data.

- Classification tests of the SOM against qualitative and financial data, then against the entire database and, finally, against the entire database without the NAF code.
- Comparison of the results obtained against other classification methods (Ward's hierarchical classification and K-means classification).

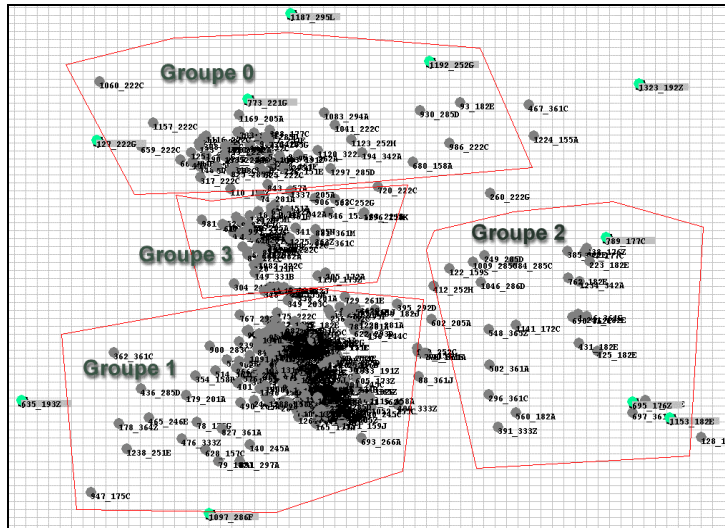
5. The table of correspondence with the code used in the base links the results for the firm to the functional standard of each group.

Tableau 1. Meaning of base codes

Variable	Value	Variable	Value
VF1	Financial debt/net worth	VQ1	Number of competitors in principal activity (multiple-choice)
VF2	Gross operating margin/sales less taxes	VQ2	Market share for new products over last two years (multiple-choice).
VF3	Financial debt/cash flow from operations	VQ3	Production process innovations over last two years (multiple-choice)
VF4	Physical investment/physical and intangible investment	VQ4	Ratio of customised to standard manufacture (multiple-choice).
VF5	Working capital requirements/net worth + financial debt	VQ5	Percentage of sales to principal customers.
VF6	Cash flow from operations/net worth	VQ6	NAF code

6. The following typology emerges from tests of the entire database excluding the NAF code:

Graph 1: All-data map (excluding NAF code)



7. Three groups stand out clearly (0, 3, 1); group 2 consists of fairly isolated firms, but their position on the map suggests that their behaviour is similar. The standard firm types for each group are the following:

Table 2. Codes values associated with standard enterprise variables

NOM	VF1	VF2	VF3	VF4	VF5	VF6	VQ1	VQ2	VQ3	VQ4	VQ5
0 331B	+ -1.1	+ -0.09	+ -1.8	+ -0.88	+ -0.58	+ -0.6	2	1	3	2	14
1 204Z	+ -1.5	+ -0.09	+ -2.9	+ -0.92	+ -0.78	+ -0.5	2	1	1	3	25
2 362C	+ -0.9	+ -0.08	+ -2.4	+ -1	+ -0.69	+ -0.4	2	5	1	3	20
3 222C	+ -1.2	+ -0.07	+ -7.5	+ -0.95	+ -0.5	+ -0.15	2	1	2	2	15

8. Converting the values from this table in terms of enterprise profiles yields the following results:

Table 3. Real values associated with standard firm variables

NOM	VF1	VF2	VF3	VF4	VF5	VF6	VQ1	VQ2	VQ3	VQ4	VQ5
GR 0	1,1	0,09	1,8	0,88	0,58	0,62	5 à 10	< 20%	≥ 2	Plutôt sur mesure	15%
GR 1	1,5	0,09	2,9	0,92	0,78	0,51	5 à 10	< 20%	0	Equivalent	25%
GR 2	0,9	0,08	2,4	1	0,69	0,37	5 à 10	> 80%	0	Equivalent	20%
GR 3	1,2	0,07	7,5	0,95	0,5	0,16	5 à 10	< 20%	1	Plutôt sur mesure	15%

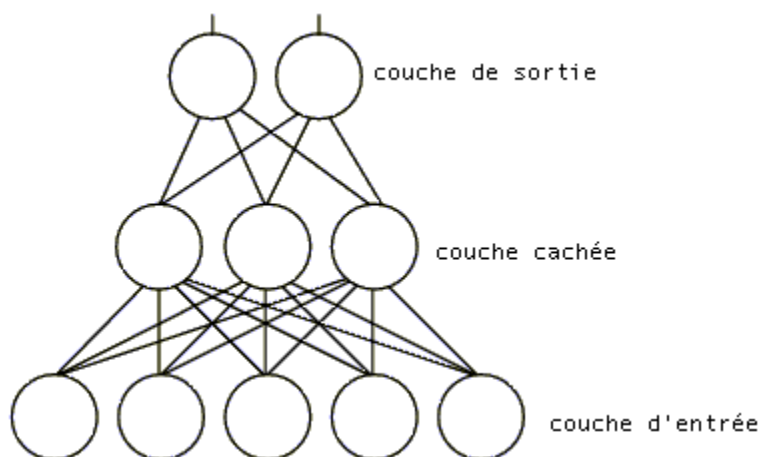
9. Although the relatively large number of SMEs in the sample made it feasible to conduct these classification tests, the small number of variables at our disposal (12) represented a significant constraint. An economic analysis of the results seems, however, to show the soundness of the SOM classification. Thus, group 0 would seem to correspond to the intellectual resources world, group 1 to the industrial world, group 3 to the interpersonal world and group 4 to the market world. These four worlds of production are revealed by the SOM-based typing.

2. Calculating the score

10. According to S. Haykin, "A neuron network is a processor distributed massively in parallel and which has the natural propensity to store experimental knowledge and make it available for use. It is similar to the mind in two aspects:

- Knowledge is acquired by the network by means of the learning process.
- The weights of the connections between neurons, known as synapses, are used to store the knowledge."

11. Neural networks thus offer an interesting alternative to conventional statistical methods. In contrast to traditional econometrics, the neural network does not require explicit formulation of the model to be estimated (although authors from the SAS group have shown that certain statistical methods correspond to certain network typologies). The standard perceptron (an unfortunate term given to the most common neural network model), depending on its configuration, can capture fairly complex and varied non-linear models.

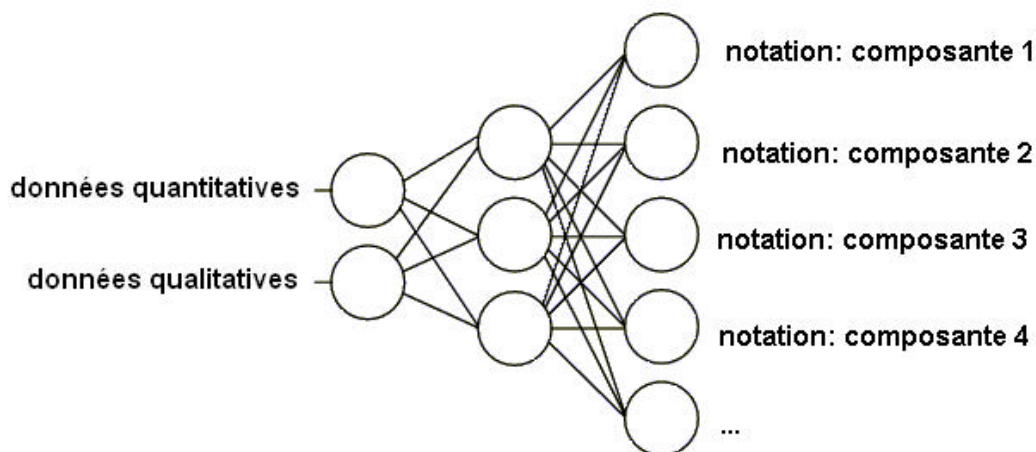


12. State variables are introduced to the input layer (accounts, ratios, sector etc.) and target variables to the output layer (bankruptcy, renegotiation, solvency indicator etc.). The network then calculates the optimum synaptic weights so that the input, through the weighted intercombination of cells, approximates the output as closely as possible: this is the training process.

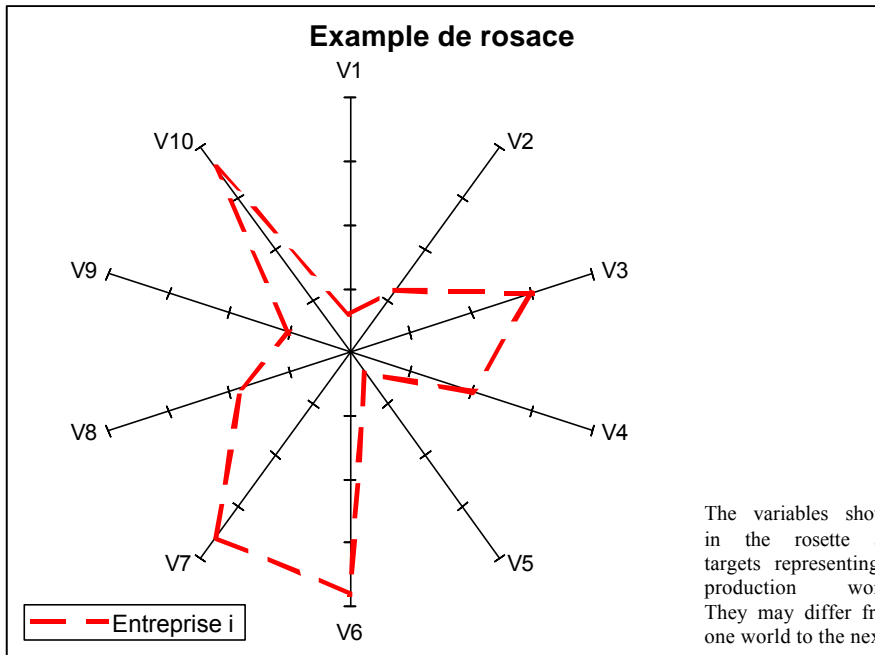
13. Using a neural network generally involves four stages: choosing the sample, preparing the structure, training and validation.

Constructing the rating or score

14. Neural networks are estimated in order to produce a score that will facilitate management of an SME's growth, and not to penalise the firms concerned. For this reason, it is preferable for the components of the score to be as qualitative as possible. For each of the groups shown in the previous section, we must estimate one or more neural networks and select those for which the results are best (those with the lowest error rate).



15. When we come to actually implementing the perceptrons, we will associate a number of indicators with "score components" or "target variables" which must be selected in light of what we want to measure with the help of the score. These "target variables" will thus be known for the firms used in implementing the method (the validation sample) and will be estimated using the perceptrons during the scoring exercise. Since the relationship between the input variables and the target variables has been determined by training with the sample, state variables corresponding to input variables for any firm can be used to predict the target and hence to calculate the score. The perceptron thus makes it possible to associate positions with indicators the meaning of which is known, in terms of enterprise quality, and, once the score has been validated, to estimate the components of the score, which will then take the following shape:



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