

# **Risk Assessment and Risk Management in Small Enterprises: The issue, an ‘exploratory’ case study and a short-term outlook.**

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**Abstract:** This article aims to present a reflection on the vulnerability/hazard-proneness of SMEs-SMIs and more particularly of Very Small Enterprises. This research is based on studies of theoretical and methodological concepts from the sociology of organizations and Cindynics and was completed in the field with a group of small businesses. We worked in cooperation with two institutions dealing with the matter (the ISDF and the CETIM), who have developed various tools in order to assess and manage risks for small businesses.

## **Introduction**

For more than twenty years, SMEs-SMIs have been systematically omnipresent in our daily lives. Whether dealing with competition, innovation or employment, the main leaders in our economic, social and political life keep reminding us that they are fundamental institutions in our modern societies. SMEs-SMIs are definitely a source place and play a dynamic role in economy, but their activities make them prone to multiple hazards (fires or explosions, pollutants, industrial accidents, natural disasters, actions from customers or third party, trade disputes, industrial espionage...). There are few studies on risk management in SMEs-SMIs. Paradoxically, most sociological studies dealing with company functioning focused on large businesses, which are fewer and above all less subject to risks [7]. Therefore nobody actually knows the real situation in SMEs-SMIs, that only becomes evident with the number of recurring reports [1] [2]:

- The difference between a risk for a firm in general and a risk for SMEs-SMIs is how serious the consequences of a high-risk event could be. Such events as a break in production, unavailable staff, a break in supplies and an estimate error turn out to be disastrous for SMEs-SMIs that eventually disappear, unable to honor their contracts.

- The central actor in an enterprise is the manager. In a large company, he can subcontract risk management to specialized services. Their means in manpower and equipment allow them to dedicate a part of their resources, even a small one, to putting a policy of risk prevention and management into position. Within SMEs-SMIs, it is the manager's responsibility alone to deal with the prevention and the consequences, in addition to daily management. As risk control requires expertise in a large number of fields, it is all the more complex to identify and assess risks, making a policy of long-term risk management almost impossible.

However there is no denying the needs for risk prevention and control. The needs are real as the manager is always responsible for the safety of the employees (Labor Laws, article L320-2), as well as for the financial health of the company. Therefore managers stand as the starting point for action as far as risk prevention is concerned and their skills must be significantly improved. Risk assessment and control in SMEs-SMIs are likely to help small businesses to survive and/or to become more competitive.

Needs for prevention are commonly met by using multiform tools such as training, advice and follow-up, the practice of self-diagnosis, sharing experience within associations and clubs of managers, information supply and research, understanding the economic situation... This research work was initiated in order to attempt to see how beneficial these different forms of actions turn out to be. Basically a complex approach, we have decided to analyze the tools for risk control in one of their forms: the methods of self-diagnosis. Our study will be limited to companies of less than 50 employees, which represent 85% of French companies in the private sector with over 50% of all the employees. The number of industrial injuries is more important in these companies and their socioeconomic situation is more vulnerable. Finally, our only privileged speaker will be the manager of the SME-SMI.

### **The methodological and theoretical basis of the research: organizational culture and Cindynics**

The knowledge, the methods, the models and the tools necessary for the study were drawn from interrelated approaches: organizational culture and Cindynics.

#### **1. Organizational culture**

The concept of culture appeared in literature on organizations in the 1980s. It deals with all the various convictions and practices allowing the members of an organization to adjust to their environment. De facto it is accepted that the company members (whatever the part they play) are not just obeying orders, but are the real leaders in the company. R. Sainsaulieu [8] emphasizes that organizational culture is a system of common representations on work, technique, functions, relationships and a code of living, that is to say on the way how to produce, communicate decide, inform...

Culture can be perceived in a succession of different levels, starting from a centre and going to a peripheral layer. Mitroff and al. [6] propose the 'onion ring' model of culture (fig. 1). There, culture is composed of a core with the personal values and convictions of the members of an organization and of peripheral layer corresponding to the physical manifestations of culture. In between these two extremities, different daily practices can be found, such as norms, ceremonies, heroes, rites, and artifacts.

Then the question is how culture, and its shared convictions and values, can influence risk control within complex systems.

## 2. How to relate culture and risk ? Cindynics

Cultural values and risk management within an enterprise (whatever the size) are unseparable. That is the key hypothesis of our issue. This hypothesis has already been analyzed by the Berkeley Group composed of T. Laporte, G. Rochlin and K. Roberts [4] whose works define the characteristics of HRO (High Reliability Organizations). In that type of organizations, the culture of reliability organizations is defined as 'the norms, the shared perceptions, the informal methods of work and traditions emerging within the groups of operational members and supervisors involved in risk management'. Moreover, they justify the strong commitment of the members and their adherence to the norms by the creation, the development and the circulation of culture within the system. A hypothesis that needs to be reinforced with an overall, and risk-centred, scientific approach.

Cindynics offer this 'opportunity' [5]. Born in the mid-eighties, the sciences of hazards turned out to be a constructivist discipline, underlain by ethical, epistemological, axiological and deontological stakes. They are based on the systemic paradigm that presents a system of reference within which the different aspects of risk management are organized.

We proposed a set of explanatory hypotheses, constituting a set of statements explaining the studied event and projecting a diagram into reality that could explain it. It takes the form of a 'hyperspace of hazard' in five dimensions in order to be as close as possible to the disparities or lacks perceived between the representations made by the members in a specific system [5]. Thus a Cindynic situation is defined using the five following dimensions:

- data and facts,
- representations and models,
- objectives
- laws, norms, rules, codes,
- values.

Structured around those five dimensions, the question grid is reinforced by a set of seven axioms that are the basis for a deduction system.

The first one, called ‘the relativity axiom’ asserts that *the perception of hazard depends on the situation and the actor who perceives the situation*. Thus, the second one, called ‘the conventionality axiom’, states that *risk assessment depends on conventions, agreements, rules, contracts... between members*. A third one is intuitively admitted: it takes into account *the existence of contradictory aims between the actors*, underlain by stakes (economic, political, ideological...). Therefore, a fourth one, called ‘the ambiguity axiom’, states that *it is difficult to break down the way of looking at things into five dimensions* (in reference to the hyperspace of hazard).

At the end of the first part of the analysis, three axioms reveal the last three components of the Cindynic situation. ‘The transformation axiom’ analyses *the sudden evolution, when accidents occur, of the content of the five dimensions and, consequently, how ambiguities get reduced (axiom 4)*. ‘The crisis axiom’ postulates *the disorganization of the networks of actors involved in the situation*. Finally, ‘the noxiousness axiom’ asserts that *any action made in the situation both reduces and generates danger*.

An example drawn from our study (see next part) briefly illustrates our statement.

The studied firm is a PME with the statutes of a private company, specialized in making industrial and commercial buildings with metal structures, boarding and covers. It only works as a subcontractor for a larger SME. It has about fifty suppliers of raw materials and semi-finished products. There are about fifteen very little skilled or unskilled employees, a third of whom are temporary workers. The manager of the enterprise is in his late thirties and has an advanced vocational diploma in technical drawing. He created the company after his employer went bankrupt. He has various duties such as project research, estimates, work progress follow-up, meetings on the construction sites, supplying the sites with small equipment... Secretarial work and accounts are left to an accountancy firm.

After three years of existence, the company is viable. The order book is full. Still, the number of accidents is 22. They go from ‘simple’ industrial injuries, including the complete destruction of a private car by one of the construction vehicles of the company, to the most serious one, a passer-by being run over by a company car driven by an employee on his way to a building site.

We interviewed the company boss, whose record of achievements would make more than one shudder. When he was asked ‘What is the main risk for your company?’, he replied unequivocally: ‘A wrong evaluation of the construction cost of a site!’ although he had got in trouble with labor inspector (a tradition in building engineering) and his insurance company’s real concern. At the time of our interview, the manager was being ‘pestered’ by a government inspector, whose close inspection mainly dealt with the safety of the workmen, and more particularly with the fact of not using a device called ‘cradle’ that allows the safe boarding of a building. The boss did not question the usefulness of the system, but when he came to think about it, he added: ‘We can do without it, all the more

so as we must rent it, and it is not always easy to handle it on uneven ground, so it slows down the job a lot, anyway the employees agree with me.’

Far from being a caricature, this example highlights the seven above-mentioned Cindynic axioms:

- *relativity*, the government inspector considers that the company activity is hazardous (risk of traumatisms) while the ‘boss’ minimizes the situation and maximizes the financial risk.
- *conventionality*, the preventive role and/or repressive role of the labor inspector; the cover of certain risks by the insurance company.
- *finality*, for the inspector the case of the cradle is crucial for the safety of the workers whereas for the ‘boss’ and his employees it causes nuisance and makes work less efficient.
- *ambiguity*, the ‘boss’ only has an incomplete view, uncertain of the risks and hazards for his firm.
- *transformation*, the road accident and its disastrous consequences draw all the attention of the manager who focuses on his responsibilities, his priority not being a new deal or a meeting on a construction site.
- *crisis*, after the state of shock from the accident, the ‘boss’ must gradually regain his footing and go back to his daily responsibilities in order to manage his company.
- *noxiousness*, the case of the cradle is another good example as its use will guarantee the employees’ safety but will cause an additional cost (purchase or rental of the device, output loss, delay).

This systemic analysis of the enterprise is a first step towards hazard control. However it should be completed with an instrumented approach that will allow quantifying risks.

## **Case study**

### **1. The ISDF-CETIM method of self-diagnosis**

Eager to assist SMEs-SMIs with their attempts to assess technical risks, the ISDF and the CETIM have elaborated a method of self-diagnosis. It is presented in a document published by the CETIM [3]. This method gives priority to the components related to reliability and safety. It considers other components like environment, organization, etc.

This methodology is designed for production SMEs-SMIs with 10 to 50 employees and aims to:

- assist SMEs-SMIs to identify and prioritize hazards (with an internal made by the manager of the SME-SMI).
- help to analyze the situation and consider the general directions for risk assessment and control within the company.
- assist with decision-making and the implementation of plans of action in order to rule out or reduce assessed risks.

- help to implement training plans in order to eventually reinforce the expertise of the enterprise in a specific field.

This methodology is also aimed at the SME-SMI auditors. What is meant by auditor is any actor outside the SMEs-SMIs whose assignment is to assist, advise and train companies in risk assessment. On no account does the method pretend to give ready-made answers to possible problems. It enables to identify strengths and weaknesses, whether they are visible or not, and to try to find a remedy or to point them out with the approach based on reliability and safety analysis.

This method of self-diagnosis (that will also be called 'Method v.98'), in its current development, is composed of two parts (figure 3). The first one consists in evaluating the company needs in safety of functioning: the nature of the market product and the customers of the company should be taken into account. In the second part, the different components of the enterprise are evaluated in order to determine how adequate they are to the above-mentioned needs. The components are: organization, documentation, company environment, manpower, production means and manufactured products.

The different components are evaluated through questionnaires. Each card contains a set of statements to tick. There are four possible answers each time, only one being accepted:

- « True »: the statement is completely true. It is always confirmed in the company.
- « Rather True »: the statement is true BUT not always confirmed in the company. It depends on the circumstances or the equipment.
- « Rather False »: the statement is false BUT may be confirmed occasionally.
- « False »: the statement is completely false. It is never confirmed.

The cards deal with the following themes:

- Organization,
- Documentation,
- Environment,
- Manpower,
- Means of production,
- Manufactured products.

The results are evaluated through a star-shaped diagram.

In order to implement the method, managers have different documents at their disposal:

- A user's guide,
- A set of empty self-diagnosis cards,
- A set of transparencies to allow result interpretation,
- A reference guide to help with understanding the self-diagnosis cards.

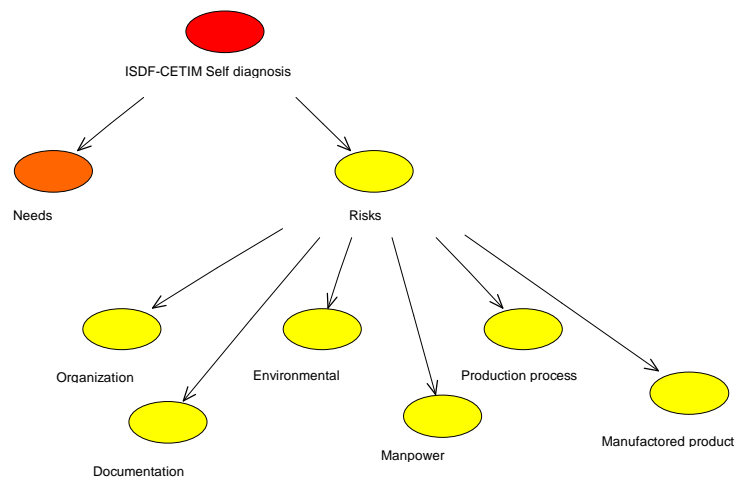


Figure 1: The components of the self-diagnosis method.

FICHE D'ENQUÊTE

**Le besoin**

Fiche n° 0

	Affirmation concernant le contexte	Vraie	Plutôt vraie	Plutôt fausse	Fausse
001	Le métier de l'entreprise est un métier à risques.				
002	Le domaine d'application requiert des contraintes SDF fortes.				
003	L'entreprise travaille en flux tendu.				
004	La production s'effectue en continu.				
005	Les procédés de production ne peuvent être interrompus.				
006	La certification ISO 9000 est exigée par les clients.				
007	Une certification métier est exigée par les clients.				
008	Le cahier des charges du client contient des clauses qualitatives de SDF.				
009	Le cahier des charges du client contient des clauses quantitatives de SDF.				
010	La responsabilité de l'entreprise peut être engagée du fait des produits fabriqués.				
011	Le métier de l'entreprise est à risque pour le personnel.				
012	L'impact financier de la défaillance d'un produit peut être énorme.				
013	Les produits peuvent avoir un impact sur la santé des consommateurs.				
014					
015					

*Partie réservée à l'évaluation*

<p>Criticités</p> <p>Points (B) :</p>	<p><input type="checkbox"/> &gt; 2, Contexte A</p> <p><input type="checkbox"/> &gt; 3, Contexte A</p> <p><input type="checkbox"/> Contexte A (B &gt; 7)</p>	<p><input type="checkbox"/> = 2, Contexte B</p> <p><input type="checkbox"/> = 2 ou 3, Contexte B</p> <p><input type="checkbox"/> Contexte B (4 ≤ B ≤ 7)</p>	<p><input type="checkbox"/> = 1, Contexte C</p> <p><input type="checkbox"/> = 1, Contexte C</p> <p><input type="checkbox"/> Contexte C (2 ≤ B ≤ 4)</p>	<p><input type="checkbox"/> Contexte D (B &lt; 2)</p>
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P.R. Leclercq - ISDF Avril 96 - Avril 97 Autodiagnostic SDF - Fiche 0

Figure 2: An example of diagnosis form

## 2. The circumstances and the course of the field experiment

In order to validate the Method v.98, a research study was initiated and realized by the Ecole des Mines de Paris (EMP) in cooperation with the ISDF and the CETIM. It took place between November 1999 and March 2000.

An 'experiment plan' had been set up and aimed to study:

- the contents and the operative mode of the method (understanding of the method by the manager, realization of the test, result analysis, document analysis, diagnosis components...),

- the reaction of the manager to this type of 'tool'. It has four main dimensions:
  - his relation to action (work organization, tool implementation, decision follow-up...),
  - his relation to knowledge (assimilation of new knowledge, training follow-up...),
  - his relation to learning (active approach),
  - his relation to environment (contacts, advisers, networks, trade unions, authorities...).

The experiment was realized through semi-direct interviews made on a group of twenty firms in different sectors (mechanics, electronic components, paints...). This 'experimental' group was set up with the assistance of the APPIM, an association of 85 enterprises that was created by the Chamber of Commerce and Industry of Nice. Some SMIs in mechanics in the Département of Drôme also cooperated. The main results of the study were published in a detailed report (Guarnieri, 2000). For reasons of confidentiality, only the acquired elements in relation to the manager's reaction to this type of tool are presented. The evaluation of the contents and the operative mode remain the property of the ISDF and the CETIM.

### **Towards an instrumented, integrated and shared approach of the hazard-proneness of SMEs-SMIs**

The present study was to aim to identify and define a first base of applied concepts, from two scientific disciplines, the sociology of organizations and Cindynics, with the intention of dealing with risk control in SMEs-SMIs.

If the method does not pretend to examine all the risks, its best quality is that it is quick and easy to implement. Thus it is a compromise between significant, easily obtained results and the more elaborate diagnoses made by auditors, for instance, that are, however, a lot longer and more costly, SMEs-SMIs can't afford it.

If the operative mode of the method is easy, certain points such as the shades of meaning between the statements are a problem: some are misunderstood; sometimes the reference guide does not really help the user with his diagnosis; some of the domains are still at their embryonic stages (environment, organization); the evaluation diagram is not easy to design...

Consequently, here follow the duties that will have to be done soon:

- to correct the identified shortcomings and criticisms ; the comments and corrections should be used in order to propose a first version of the new method of self-diagnosis.
- to improve the method: to complement the existing method at the level of the components of expertise and at the level of the directions for pedagogy and help on advice. There are two other tasks involved:



- to develop self-diagnosis especially as far as environment evaluation and organization are concerned ; considerations on legal aspects and insurance schemes could be an improvement.

- to enhance the methodology v.98 with ways of measurement of the company progress that should enable managers to follow the progress of their firm with respect to industrial risks.

These tasks should be validated on the field and complemented by a study of the conditions before the implementation of the method in the SMEs-SMIs, written down as company specifications about the following:

- how to consolidate and/or to standardize this type of tool (how to standardize the method so that it adapts to any manager's way of learning).

- how to finance the tool: total cost, the methods of obtaining financial help from third-party organizations...

- how to select external help: who gives the best training formula, the best advisory service?

- how to circulate actions: promoting the risk evaluation tool and communicating through the right relays.

The outlook from this research is twofold:

- to reinforce the use of theoretical descriptive and explanatory tools that enable to describe the various fields of hazard-proneness in SMEs-SMIs.

- to set the exploratory foundations for a theoretical tool for help with decision-making, namely, a question grid that allows SMEs-SMIs' managers to anticipate the harmful consequences of an organizational change on the performance of the company and to identify the directions for their project.

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Dr Jean-Luc Wybo is director of the Pôle Cindyniques of Ecole des Mines de Paris, a public research laboratory dedicated to risk analysis and management. His background is MSc in Physics and PhD in Computer Science. His main research topics are decision support and organizational learning for risk management. He is member of the board of directors of TIEMS.