

Organizational design and hospital performance

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ABSTRACT

This paper is only one part of a larger research that aims at modeling the relationship between organizational design and hospital performance. This research is related to the changing context of hospital payment systems. We observe the generalization of either prospective payment systems or more controlled retrospective payment systems. We want to analyze whether or not the traditional structure of hospitals is still appropriate by analyzing the existing literature in a single global model. Before modeling their relationship, we have to define hospital performance and to determine which organizational design hospital could choose. By this paper, we want to achieve it.

What does hospital performance mean? Numerous authors are interested in this difficult question and a large literature exists (Donabedian, 1966; Shulz et al., 1983; Quinn et Rorhbaugh, 1983; Cameron et Whetten, 1983; Durant, 1986; Fottler, 1987; Fetter, 1991; Kazadjian et al., 1993; Shortell et al., 1994; Flood et al.; 1994; Berkowitz, 1995; Leggat et al., 1998; Guisset, 1998; Sicotte et al., 1998). From a rational point of view, we have synthesized the major performance criteria in a rational model (Crêteur et al., 2000) in which we have retained five criteria: quality of care, satisfaction of patients, human resources, efficiency and financial results. Arbitration between some of those seems to be unavoidable and will be provided the global performance model.

What does organizational design mean? To define this concept, we refer to the contingency authors (Galbraith, 1973; Duncan, 1979; Mintzberg, 1979; Nadler et Tushman, 1988; Daft, 1991; Obel & Burton, 1998). According to these authors, organization is considered as an information process and design as an answer for information requirement. In this paper, we develop a typology of organizational design and explain how each design could be applied to health care organizations. We retain three grouping strategies for activities: functional organization group activities around resources, divisional organization around output (or pathology) and matrix organization around both (input and output). The first two designs raise co-ordination problems and therefore, three linking mechanisms are defined: linking roles, linking groups and integrators. The matrix structure implies the most complex integration mechanisms. In total, seven designs are determined: functional and divisional groupings associated to each of the three linking strategies and the matrix form.

We conclude with future researches that will allow us to model the relationship between organizational design and performance. The literature analyzing the relationship between performance and design often considers only one dimension of performance and design. For instance, authors use only profit for performance or only information system for describing design. In future research, we would like to integrate this existing literature and its partial contribution in a single global model. We could validate this model thanks to simulation of the organizational behaviors in alternative designs and thanks to a contextual analysis. Thanks to simulation, we will determine more precisely and illustrate how design could explain hospital performance. Contextual analysis will permit to see how design influence performance in comparison with rival explanations.

KEY WORDS: PERFORMANCE, ORGANISATIONAL DESIGN, HOSPITAL, HEALTH CARE, MODEL, PATIENT PROCESS, INFORMATION SYSTEMS, and SIMULATION

HOSPITAL CONTEXT and MOTIVATION of the research

PAYMENT SYSTEMS

In many western countries, the today's hospitals cope with economical, technological and social pressures. «The current environment for health care organization contains many forces demanding unprecedented levels of change. These force include changing demographic, increased customers expectations, increased competition and intensified governmental pressures » (Chow, 1998).

This research is more particularly related to the changing context of hospital payment systems. Regulation mechanisms are introduced mostly by payment systems. The purpose of these mechanisms is to control the health care expenses, to obtain a better allocation of the limited resources and an improvement of efficiency (Johnson, 1996, in Guisset, 1999). Political authorities introduce measures to encourage efficiency by mean of a limited reimbursement or of the introduction of financial risks (all real costs are not reimbursed) or by mean of a certain degree of competition between health care suppliers (Guisset, 1999).

In western countries, we observe the generalization of either prospective payment systems or more controlled retrospective payment systems. We wonder whether or not the traditional hospital structure is still appropriate to face to this generalization.

The Belgian payment system for hospitals is essentially a *retrospective system*, the so-called "Leburton" system. Institutions receive payments according to the number of acts and days. Reimbursement is thus calculated according to the activity level (Cobbaut-1992). The main reason for this criterion was the development of a system able to provide care for everyone.

This system unfortunately might lead to many perverse effects. The remunerative outputs are individual acts or hospital days. Thus, a hospital manager is considered to be effective when he maximizes these two outputs. It might encourage hospitals to over-consume and to waste their resources, which are paradoxically limited, and to multiply the number of inpatient days, since it increases their payment.

The major problem is that the control of resources does not come automatically with the retrospective payment system. Some measures of health care ministry demonstrate the awareness of the lack of control and encourage hospital to reduce their potential pernicious effects (hospitals with average length of stay higher than some standard level are penalized).

For Fetter (1991), the problem with such a payment system is to consider the intermediate output of hospitals (patient days, medications, surgical procedures, laboratory procedures, ...) as basis for payment instead of considering the real final products (to treat patient who have illnesses).

To ensure a better resource control, a *prospective payment system* seems very attractive: the hospital receives a flat rate per episode of care according to the complexity of the acts. This amount corresponds to the costs of care and is adapted to each particular pathology. The prospective payment system is directed towards the minimization of consumed inputs (cost and length of stays). This payment system is used in the United States: patients are classified by type of pathology (DRG' S) and, according to this classification; hospitals receive a restrictive envelope by patient (Fetter, 1991). Then it falls on the hospitals to organize care in the most efficient way according to this received budget. It encourages hospitals to reduce the duration of stays, to limit the act consumption and to support the ambulatory surgery centers and the outpatient visits.

Even if this system seems very attractive in terms of consumed resources, it might cause also many misuses. Perverse effects also exist for prospective payment but rather on produced outputs: the increase of inpatient discharges (not always useful), the overvaluation of degree of pathologies severity, the under-consumption of hospital care and the negative impact on quality of care, the danger to slow down technical progress and finally, the move of spending towards substitute and less controlled care. These are the perverse effects that M-C Closon (1992) underlines during its evaluation of DRGs payment system.

In the journal of the American Medical Association, Wynia et al (2000) criticize the current American payment system and raise the question of the very constrained coverage for service that physicians provide to their patients. These physicians believe that gaming the system is necessary to provide high-

quality care today and they sometimes manipulate reimbursement rules “to help patient secure coverage for needed treatments or services (exaggerating the severity of the patient’s condition, changing the patient’s official diagnosis and/or reporting signs or symptoms that patient did not have”. Erickson et al. (2000) raise the risk of increasing the gap between rich and poor people (with higher quality hospitals for richer patients that can obtain more expensive private insurance and lower quality hospitals for poorer patient with private managed care and Medicare managed care insurance).

Table 1 compares the two payment systems that we just have described.

Our problematic is founded on a sad observation. Whatever the decision about hospital financing, sad is to note that hospital performance is not automatically assured. Pernicious effects are always possible. We understand easily why western hospitals are always more controlled by the political authorities. Constrained by these pressures, hospital managers are forced to revise completely the internal organization of the hospital. It is also essential to elaborate a tool to control and evaluate performance inside hospitals. Performance should be evaluated on the different dimensions that we mentioned in Table 1 (input and output orientation) and that payment systems cannot sufficiently control.

Table 1: Retrospective payment system versus prospective payment system

| <u>Retrospective payment system</u> | <u>Prospective payment system</u> |
|---|--|
| Orientation (outputs maximization): Access to care for everybody. | Orientation (inputs minimization): Length of stay, costs minimization, ambulatory surgery centers development. |
| Perverse effects (on inputs): Resource waste: Increase of length of stays and acts consumption. | Perverse effects (on outputs): Risk for quality: excessive restriction of care. Brake for technical innovations. Spending move towards substitute or less controlled care. |

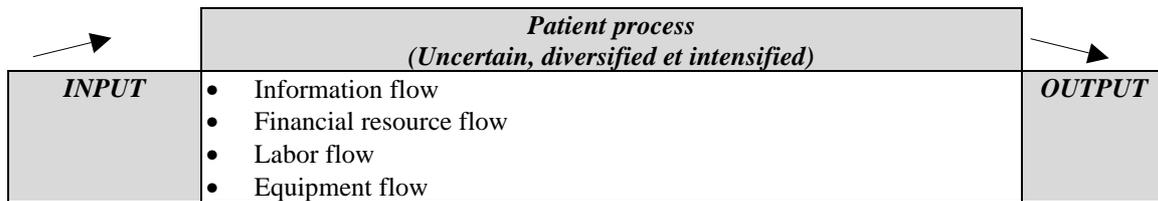
WORKORGANISATION: the patient process

Even if the organizational structure of today’s hospitals is still very divided in units in which professionals are less disposed to collaborate and are focused on the achievement of specific tasks, there are important pressures to develop a more global view of the health care process, which requires a better collaboration and communication between the different disciplines. Jonas (1998) adds “*hospitals have internal problems with vertically organized structures that are not well integrated at the service levels....This kind of separation make it very difficult to provide integrated patient-care programs in which those at the functional level follow in one direction in order to best meet patient needs*”.

The global view of the patient flow focuses on the concept of patient **process** and on its efficiency. The patient process, which is defined by the sequence of cares received by the patient during his stay is the primary process in the care production system. Other secondary flows or processes gravitate around this patient flow: information flows and resource flows (equipment, labor and financial). Evaluating the performance of the patient flow requires also the performance analysis of each of these flows.

The development of more controlled payment systems requires some intensification of the patient flow (Minvielle, 1998). Most hospitals want to reduce the patient length of stay, to maximize the number of treated patients and to maximize the utilization of the available resources. Moreover, as the number of pathologies and the number of potential treatments increase, this patient process is diversified and becomes more uncertain. Finally, this patient process cannot be evaluated without considering their important requirements concerning the quality of care. Figure 1 represents the uncertain diversified and intensified patient process. Our research should take this process into account and analyzes its performance, essentially in terms of efficiency and effectiveness.

Figure 1: Processes of input transformation into outputs

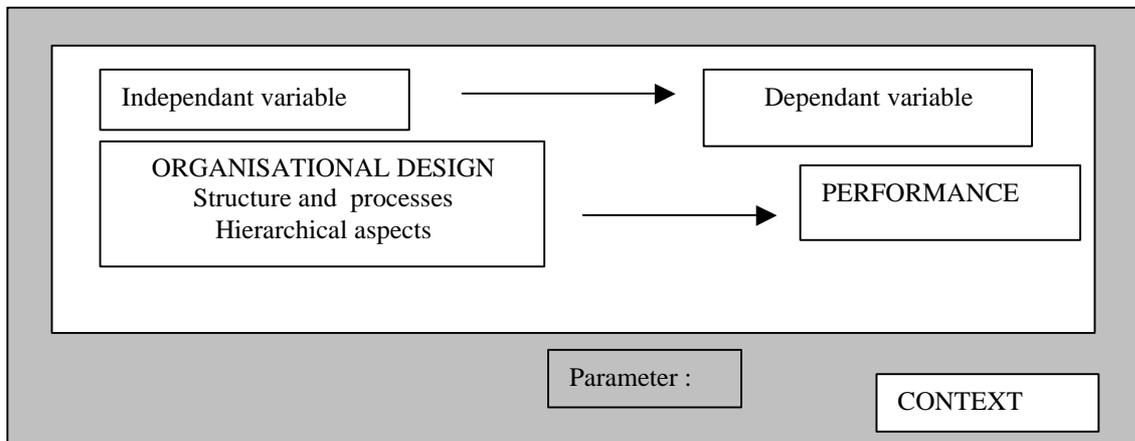


This focus on the global patient process triggers questions on the organizational choices usually adopted by the hospitals. Numerous managers wonder if the traditional organizational mode, oriented around the hospital functions, is still adapted or if another organizational strategy should not be elaborated. The focus on the patient process emphasizes also the interdependence between the different hospital departments and the need for co-ordination mechanisms.

Donabedian (1966), who sets up the conceptual framework for the performance evaluation in health care systems, connects the “process” notion to two other concepts: the organizational structure and the outcome. Accordingly, we consider these three notions as completely interrelated and central to evaluate hospital performance.

Fottler (1987) proposes an alternative formulation of Donabedian’s framework and considers structure and process variables not as indicators of performance but as independent determinants of various organizational outcomes. This alternative formulation is very attractive. Performance scores calculated in a first step synthesize results obtained for various outcome indicators. In a second stage, the structural and process measures or more generally the organizational design will explain these scores. Based on the Fottler’s framework, Figure 2 presents our basic assumption about the relationship between performance and organizational design.

Figure 2: Organizational Design and Performance



In our assumption, this relation is always developed in a particular context, whose impact on the performance should also be considered and evaluated. In the next section, we explain why the process of strategic negotiation between this operational center (health care units) and the manager is also a relevant variable to explain performance in this basic assumption.

HIERARCHICAL ASPECTS, managers and physicians

The decision-makers are different and pursue different goals at different stages of the production process. Physicians control the amount of produced services and their scheduling. The necessary resources for this demand are however essentially under the control of the managers (Dhoore, Guisset, Sicotte, 1999). So, the available resources depend on legal norms (minimum number of nurses) but also on management practices and strategies. According to Harris (1978), the medical workforce makes decisions related to the patient (demand side) and the administration supplies the support services needed for the demand of the physicians (supply side). Harris adds that two firms exist in hospital: one controlled by physicians, and one by managers. These firms are not independent.

In order to assess some hospital's management performance we have to model the complex relationship between these two sides. Our challenge is to measure the effect of one side on the other side. The medical decisions are dependent to the resource availability. Even if physicians have the final medical responsibility, the resources allocation depends on the managers. Physicians can participate to this decision but this depends on their degree of participation to the hospital's management. According to Goes and Zhan (1995), the participation of physicians to managerial decisions is correlated to higher profits, higher occupation rates, and lower costs.

We develop in this research a global performance model, considering both sides: resource allocation performance and patient scheduling and treatment performance. Our basic assumptions illustrated in Figure 2 stipulate that variations in performance are not completely explained by differences in pathologies' heaviness but also by the internal organization of care. This includes the organizational structure, the patient operational and scheduling processes and the interaction between physicians and managers.

As an illustrative example, by considering these two sides, Mintzberg (1992) explains why the functional organization is usually observed in hospitals. The main reasons, which are most often invoked, are the potential economies of scale and the resource usage minimization that the functional organization permits. Mintzberg emphasized another reason: functional organization in hospital is often related to the political power of some physicians that have first of all disciplinary objectives and permits to them to control the consumed resource. According to Mintzberg et al. (1992), Harris, (1978) and Moisdon et al. (2000), the functional departments are more likely to "cheat" because those give power to the physicians.

When we will model the organizational design, it will be important to not neglect the hierarchical relations that each design choice implies. In future researches, we want to model two interrelated decision processes in various design structures: the ***resource allocation process***, that takes place at the hierarchical level and the ***patient scheduling process***, which is an operational decision but which is influenced by the resource allocation decision.

RESEARCH PURPOSE

We have described so far the elements of the hospital context that are important for our research problematic. The generalization of prospective or more controlled payment systems in hospitals yields to new performance criteria that forces hospital managers to revise the care production system. In this context, one new challenge for hospital managers is to find the most appropriate organizational design to face these more controlled payment systems. From this challenge, this research is devoted to the elaboration of a model that would allow hospital manager to better understand and assess the impact of their organizational decisions on the hospital performance.

The elaboration of such a model raises several more specific questions:

- *What does organizational design mean?* Which organizational choices can a hospital manager take? What do these choices imply on the hierarchical relations inside the hospital?
- *What does hospital performance mean?* Which performance criteria should be used to assess each potential design?

- *How to model the relationship between organizational design and performance?* Which hypotheses related to this relationship do we have to make in order to elaborate a single global model? What are the roles of the resource allocation process and of the patient scheduling process in this relationship?

In this paper, we are tackled the two first above-mentioned questions. Our future researches will try to elaborate a model aiming at explaining the hospital performance by or from the organizational design decisions

Organizational performance and organizational design, theoretical framework of our research

A literature review related to the organizational performance models and related to the organizational design models permitted to us to find interesting similarities.

Sicotte et al. (1998) synthesize four performance models frequently found in organizational performance literature (« *Open System Models* », « *Rational Goal Models* », « *Internal design Models* » and « *Human Relation Model* ») and propose a comprehensive model, called organizational performance assessment (OPA) model. Morin and al. (1994) and Leggat et al. (1998) develop similar synthesis of organizational performance model.

Scott (1998) realizes an interesting synthesis of organizational design literature. He defines three different views under which organizations are analyzed: “*Rational Systems*”, “*Natural Systems*” and “*Open Systems*”. These approaches are very close to those that we met in the organizational performance theoreticians. These perspectives give a very useful framework to our research (**Table 2**).

Sicotte et al. (1998) propose a first level of analysis to evaluate organizational performance, related to organizational adaptation to environment (“*Open System model*”). This level aims at handling opportunities and threats of the environment. Organizational performance evaluation is always performed in a particular context, which has to be specified. Organizations are not closed systems but are open and depend on the environment in which they are. Scott (1998) defines a similar view of organizations (“*Open Systems View*”): « *Organizations are coalitions of shifting interests groups that develop goals by negotiating; the structure of the coalition, its activities and its outcome are strongly influenced by environmental factors* ».

Hospitals are in a more and more controlled and regulated context and are obliged to elaborate performance evaluation tools and to benchmark their results with the ones obtained by others. In this paper, we refer to Galbraith (1972, 1973) who considers the organization as a process of information handling and the environment as determinant of the amount of information that has to be processed. Even if the environment is secondary in our work in comparison with design and performance variables, it will remain an important parameter.

To measure the achievement of the objectives (“*Rational Goal Models*”) is the second level of OPA model suggested by Sicotte et al. (1998). These objectives are translated in terms of efficiency, effectiveness and satisfaction of internal and external actors.

These objectives could not be achieved without an effective organizational design. This leads to the third level that is related to the analysis of production system (“*internal process design*”). Organizational structures and processes, formal and informal, are analyzed and are considered as explaining variables. This view is consistent with the general purpose of this work that aims at determining how organizational design influence the performance level.

Sicotte (1998) proposes a fourth level of analysis that aims at analyzing culture and values of the organization. Similarly to the third dimension, these factors explain the way of which objectives are achieved.

Scott (1998) defines the rational view that several authors adopt to define the organization (“*Rational Systems View*”): « *Organizations are collectivities oriented to the pursuit of relatively specific goals and exhibiting relatively highly formalized social structure* ». This definition insists firstly on the normative aspects of organizations that search for particular goals and is connected to the rational objective models of Sicotte et al. (1998). This is partially consistent with the internal process design models, excepted that those are interested to the formal and informal aspects of the organization. Our integrating model, related to the relationship between design and hospital performance, will be elaborated cross this rational view (Table 2).

Scott (1998) defines a last view of organization. This can be considered as a *natural system* that aims at surviving by developing different structures and cultures in order to achieve their objectives

(“Natural System View”). « *Organizations are collectivities whose participants share a common interest in the survival of the system and who engage in collective activities, informally structured, to secure this end (Scott, 1998).* » This view covers partially the third dimension (in his informal aspects) and completely the last dimension of Sicotte et al. (1998) related to the organizational performance models.

Even if this dimension is not considered in this paper, we want to consider it in future papers. A contextual analysis will permit to us to introduce less objective and rational variables in order to determine how these variables affect the relationship between structural choices and performance.

Table 2 summarizes these perspectives that are met in the literature related to the organizational performance and in the literature related to organizational theory. This table shows the relationship between these different views and the important stages of this paper. In the first section of this paper, we specify the importance of the context to which today’s hospitals face. The next sections define the concepts of hospital performance and organizational design. To define those concepts and to understand their relationship, we will adopt a very rational view. Nevertheless, in order to go over this rational view, we will explain how future researches will permit to us to measure the impact of less formal variables.

Table 2: Relationship between organizational performance models, organizational designs models and stages of our research

| Paradigms of different models in the two literatures : | | Key elements of our research |
|---|---|--|
| Organizational Performance (Sicotte et al 1998) | Organizations theory (Scott, 1998) | |
| Open system models | Open systems | <u><i>Hospital context : a parameter</i></u> |
| Rational goal models | Rational systems | <div style="text-align: right;">↗</div> <hr style="border-top: 1px dashed black;"/> <u><i>RATIONAL VIEW Performance Model</i></u> <u><i>Typology of organizational designs as explaining factors of performance</i></u> Formal structures and processes as explaining factors of performance scores <u><i>INTEGRATING Model of the relationship between organizational design and performance</i></u> <div style="display: flex; justify-content: center; align-items: center; gap: 20px;"> <div style="border: 1px solid black; padding: 5px; text-align: center;">ORGANISATIONAL DESIGN</div> <div style="font-size: 24px;">→</div> <div style="border: 1px solid black; padding: 5px; text-align: center;">PERFORMANCE</div> </div> |
| Internal process design models FORMAL | | |
| UNFORMAL | | |
| Human resource models | Natural systems | <div style="text-align: right;">↘</div> <hr style="border-top: 1px dashed black;"/> <u><i>Contextual analysis (future research)</i></u> This analysis will permit to determine the impact of less formal variables (for instance: political factors) on the relationship between performance and design. |

HOSPITAL PERFORMANCE

We describe performance from a very rational viewpoint according to which hospitals pursue specific goals and which organization is built only in order to achieve these objectives.

ORGANISATIONAL PERFORMANCE: A multidimensional construct

One criterion only cannot evaluate hospital performance. This concept covers a large number of dimensions that are explained by the presence of several actors or groups of actors, each with their own objectives. The performance and its evaluation describe a complex reality composed of multiple elements.

Numerous organizational performance models have been proposed in the literature. Quinn and Rorhbaugh (1983) insist on the multidimensional aspect of organizational performance and also on the complementary character of these dimensions. Each organizational performance dimension represents only some particular performance factors. Quinn and Rorhbaugh (1983) analyze existing organizational performance models and conclude that criteria related to these different models can be either opposite or complementary and so, that performance assessment supposes always trade off between numerous variables that are never completely compatible.

According to Cameron and Whetten (1983), each conceptual framework of performance highlights only some organizational performance aspects and neglects others. That is why no model can be considered as being the best one, or as containing the others.

In these statements, two elements are important: performance assessment is multidimensional and is context-related. In a particular environment, the performance evaluation process should distinguish relevant variables from secondary variables. The numerous dimensions that will use for the hospital performance evaluation are meaningful and relevant only in the particular context to which hospitals face.

Efficiency and effectiveness: two key words

Organizational performance assessment, two key words are frequently used: effectiveness and efficiency (Fottler, 1987; Durant, 1986; Sicotte et al., 1998; Flood et al., 1994; Burton & Obel, 1998).

Effectiveness (“do the good things”) is measured only in terms of production and quality of care (output) - *for instance: total inpatient days, total inpatient discharges, total outpatient visits*. Because resources are limited, outputs should be declined in terms of their cost, their so-called cost efficiency.

Efficiency (“do it well”) is usually defined as total allocated resources (input) divided by production (output) - *for instance: cost by stay, average length of stay* - or as a productivity index, total output divided by total resources – *for instance: occupation rate, number of admissions divided by the total number of nursing staff hours*.

Both criteria are really important. Hospitals have to be simultaneously effective and efficient. We can observe effective care without being efficient and vice versa. Hospitals can spend the same amount of money for identical patients but with very different effectiveness levels and can obtain the same level of quality for patients with various efficiency levels.

Health care managers have to achieve at least a satisfactory level on both criteria simultaneously. This raises the question of whether the achievement of efficiency and effectiveness is possible or whether tradeoffs are unavoidable (Fottler, 1987).

Several findings in hospitals suggest that the two are compatible (Shortell and al, 1976; Shultz, Greenley, & Peterson, 1983). These findings suggest *that various managerial mechanisms designed to control costs seem also associated with more careful attention to the quality of care* (Fottler, 1987).

Hospital organizational performance assessment

Several years ago, Donabedian (1966) distinguished three indicators of health care organization performance: **structural, process and outcome indicators**.

Structural indicators include organization or participants features (size, for profit status, teaching or not, ownership...)

Process indicators are related to the organization's activities carried out to improve or control organizational performance (co-ordination, human resource management, planning...)

Outcome measures are based on clinical measures of quality, patient satisfaction, employee attitude, efficiency and financial outcome.

Fottler (1987) proposes an alternative formulation of Donabedian's framework and considers structure and process variables not as indicators of performance but as independent determinants of various organizational outcomes. This alternative formulation is very attractive. Performance scores calculated in a first step synthesize results obtained for various outcome indicators. In a second stage, these scores will be explained by structural and process measures. It is necessary to link the observed outcome to the organizational structure and process characteristics (less controllable). « *Evaluation of structure and process measures is important and should not be neglected, as these provide the basis for the development of management and policy decisions* » (Zuckerman et al., 1995).

Extensive research should be realized in order to understand better the relationship between these three concepts (structures, processes and outcome) and the contingencies that affect these relationship (Fottler, 1987). This paper aims at developing the understanding of this phenomenon.

Fottler considers seven outcome variables decomposed in **efficiency** (*productivity and cost efficiency*) and **effectiveness** (*quality of care, patient satisfaction, human resource-employee attitude and behavior, financial outcome, adaptability and survival*).

He retains more precisely these four criteria: **quality of care, patient satisfaction, cost efficiency** and **financial results**. Efficiency and financial results can give an idea about hospital viability.

Shortell, Flood and Scott (1994) insist on the introduction in organizational performance model of indicators related to **human resource management** (employee satisfaction can be measured by turnover rate and absenteeism, full time equivalents (FTE's) measure labor loading...).

For each performance criteria, indicators should be measured, that is defined *as an observation expected to indicate a certain aspect of performance* (Kazandjian and al, 1993). They are evaluative (their purpose is to assess or judge), they include a reference point so that current achievement can be compared to past performance or to another standard (Berkowitz, 1995). Flood et al. (1994) add that outcome measures focus on the changes produced or the results achieved.

We follow the approach proposed by Fottler but also propose, as Shortell, to distinguish human resource management (in terms of inputs and satisfaction) as performance indicators. Table 3 **Erreur! Source du renvoi introuvable.** quotes outcome criteria that permit health care performance assessment and the indicators the most frequently used to evaluate them. This list is thus not exhaustive. Table 3 adds the input or output status of each criteria. This status permits to see if the criterion is related to the allocated resources (input) rather than to the accomplished service (outputs).

Fetter (1991) gives also an interesting view of hospital performance. According to him, a hospital operates two separate but related production functions. First a set of disease functions converts inputs into intermediate outputs and second, processes of patient care by which physician orders result in bundle of these output being delivered to each patient. For Fetter, the main problem in managing a hospital is to separate **efficiency** in the production of intermediate products from issues of **effectiveness** in the utilization of these intermediate products. In Figure 3, we present these two interrelated functions and present the relationship with our selected performance criteria. The five above-mentioned criteria cover these two functions described by Fetter. The efficiency, the human resources and the financial outcomes are more related to the efficiency function and the patient satisfaction and the quality of care to the effectiveness function.

We conclude this section with additional remarks about indicators. As we have just said, for every criterion, indicators should be developed. These indicators should be relevant, measurable, available and as objective as possible (Shortell, Flood and Scott-1994). The choice of these measures should be very judicious. Creating duplicate measures incorporating different perspectives for some objectives can lead to an array of indicators, which may result in information overload. It is necessary to select only measures that are critical to control performance (Leggat et al., 1998). The number of indicators should be limited, but should necessarily measure all the above-cited criteria. Second, necessary information to measure these indicators is not always very easy to obtain. Belgian hospitals are more and more aware of the need for large databases. The current problem is often a bad data use. Improvements of hospital information system are still necessary (Guisset AL., 1997).

Table 3: Summary table: performance criteria, example of indicators

| <u>CRITERIA</u> | <u>Human resources</u> | | <u>Efficiency</u> | <u>Patient satisfaction</u> | <u>Quality of care</u> | <u>Financial outcome</u> |
|-------------------|---|---|---|--|---|--|
| <u>INDICATORS</u> | Staff satisfaction - Turnover - Absenteeism Personnel - Satisfaction survey | Number of FTE's -Nurse -physician | Cost by patient Average length of stay Occupation rate of beds ... | Total complaints Short reaction time Satisfaction survey Total outpatients visits(ambulatory services) ... | Mortality rate (Co)morbidity rate Readmission rate ... | Financial ratio Return on assets Day price |
| <u>STATUS</u> | OUTPUT | INPUT | INPUT/ OUTPUT | OUTPUT | OUTPUT | OUTPUT/ INPUT |

Figure 3: Product of a hospital and relationship the performance of our criteria – Inspired by Fetter (1991)

| | | | | |
|--|---|--|---|--|
| INPUTS Labor Material Equipment Management | Hospital operations → | OUTPUTS(intermediate) Patient days Meals Laboratory procedures Surgical procedures Medications ... | Physician orders → | PRODUCTS Vaginal delivery W/O COMPLICATION DIAGNOSIS APPENDECTOMY W/O Complicated principal diagnosis, AGE <70 W/O CC Lens procedure |
| Alternate formulation of the performance dimensions | EFFICIENCY <u>Human resource</u> <u>Efficiency</u> <u>Financial outcome</u> | | EFFECTIVENESS <u>Quality of care</u> <u>Patient satisfaction</u> | |

ORGANIZATIONAL DESIGN

This section aims at defining the organizational design generally and in the particular case of hospital organizations. A synthesis of the literature enables us to elaborate a *typology of the structural choices* applied to hospitals.

Contingency principle

Definition

For thirty years, the contingency theory became dominant for studies related to the organizations. The contingency school search for explaining the way with which organizations are structured through the influence of context variables. The first authors who referred to this principle are Bruns and Stalker (1961), J Woodward (1965) and Lawrence and Lorsh (1973). Today, Galbraith (1973) and Mintzberg (1982)'s works about contingency are impossible to circumvent. Inspired by the researches of Galbraith; Nadler, Hackman and Lawler (1979); Duncan (1979); Nadler and Tushman (1988) and Daft (1991) contribute to enrich this contingent stream. More recently Burton and Obel (1998, 2000) elaborate a large model aiming at integrating contributions of these various authors. The common point of these studies is that their authors search the most appropriate structural choices in a particular context.

The central idea of the contingency theory is the next one: it *does not exist a best organizational structure but well a more adapted structure in a particular context*. In other words, organization are not similarly effective or efficient in a particular context (Galbraith, 1973). The structure should be selected in order to be adapted at best to its environment. Structure should be adjusted to the environment's changes (Amblard, 1996). The company should be adapted constantly to its environment to avoid its disappearance. It is important to see that the structure depends on the environment but not only on a mechanistic way. We exceed the Taylor view, which considers the organization as a closed system with performance depending only on work procedures. The structure depends not only on its environment but also on the goals that propose to follow the leaders. Two key concepts emerge: *adjustment* of the organizations compared to their environment and *coherence* of the internal organization. Given the consistency of the contingency factors to which the organization faces and given the internal consistency, some structural parameters are more appropriate (Obel and Burton, 1998).

Interest

We now specify the reasons for which the contingency authors represent one of the main sources of our search.

First, as we specified above, the starting point of our research is the disturbed context to which the hospitals face. The revising of the traditional organizational choices and the demand for more complete assessment and benchmarking tools come from the context. This is consistent with the contingency principle that considers structure changes as organizational means of context change adjustment. As we will see later, Galbraith (1973)'s view, which considers the organization as a treatment of information, is attractive. The information requirement depends on the context and the capacity to process this information is ensured by the design. Effective and efficient designs are chosen in order to establish an equilibrium between information capacity and requirement.

Then, one of our objectives is to elaborate a typology of the possible organizational choices for the hospital. Certain contingency authors (Galbraith, 1973; Nadler and Al, 1979 and 1988; Duncan, 1979; Mintzberg, 1983, Daft, 1991; Obel and Burton, 1998) are very useful because they realized several typologies and definitions of the possible organizational choices. We will synthesize the contribution of these various authors in order to elaborate our own typology of organizational choices applied to the Belgian hospitals.

Lastly, our wish is to build a single global explanatory model related to the effects of organizational design on performance in specific decision processes of the hospital institutions. The contingency theory is an excellent starting point for our analysis of the organizational behaviors. Many assumptions, from this theory and related to the structural choices and their implications, can indeed be used in order to elaborate an explanatory model (Levitt and Al, 1999).

Organization as a process of information handling

Galbraith (1973) is one of the first to have considered the organization as an information handling process. The structure should permit to handle at best the information requirement. Other authors take also the same point of view (Nadler, Hackman and Lawler, 1979; Nadler & Tushman, 1988; Daft, 1991; KUMAR, Ow & Prietula, 1993; Obel & Burton, 1998).

Galbraith (1973) uses the contingency principle. There does not exist a better structure but well a more appropriate structure in a particular context. According to Galbraith, the most relevant organizational role is to handle the information. Galbraith proposes various forms of designs that an organization can adopt given the amount of information that has to be processed. Nadler and al (1979) described this principle under three proposals:

Proposal 1: the various organizational tasks develop various degrees of uncertainty and require various degrees of communication between the units (information requirement).

Proposal 2: various structural combinations provide various capacities to process information (information capacity).

Proposal 3: the organizational performance will be the largest where the capacity to process information corresponds to the informational requirement (correspondence between capacity and requirement).

It is now necessary to determine what information requirement and capacity mean.

Information requirement

The information requirement depends on the characteristics of the environment in which an organization is (Figure 4).

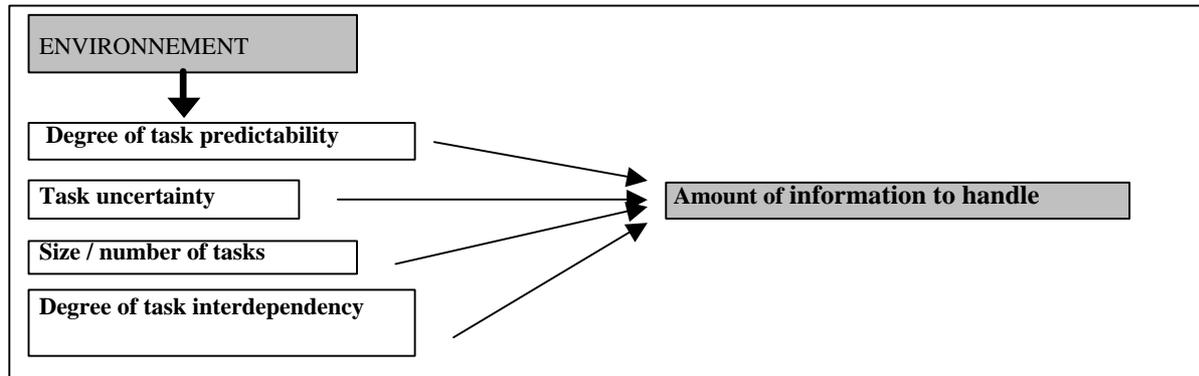
For Lawrence and Lorsh (1973), Galbraith (1973), Nadler and al (1979 and 1988), the amount of information that has to be handled depends on *degree of predictability* of task requirements. Indeed, more important the task uncertainty is, higher the amount of information that has to be handled is.

For Galbraith (1973), the organization *size* influences the amount of information to be handled. It is necessary to process more information if the number of activities grows and if the number of elements used for the decision-making increases. Mintzberg (1979), Daft (1991) and Obel and Burton (1998) also emphasize the size as a determinant of the structural choices.

According to Burns and Stalker (1961), Nadler (1979), Mintzberg (1979), Duncan (1979) and Obel and Burton (1998), an organization, with relatively *stable tasks* to realize, requires less amount of information to execute them in comparison with an organization with unstable tasks (dynamic environment).

A last element is suggested by Lawrence and Lorsh (1973) and is used by other authors: Galbraith (1993), Mintzberg (1979), Duncan (1979), Nadler and al.(1979 and 1988), Daft (1991), Obel & Burton (1998). The tasks are interrelated and must be coordinated. The amount of information to be handled grows as the degree of interdependence between the tasks increases.

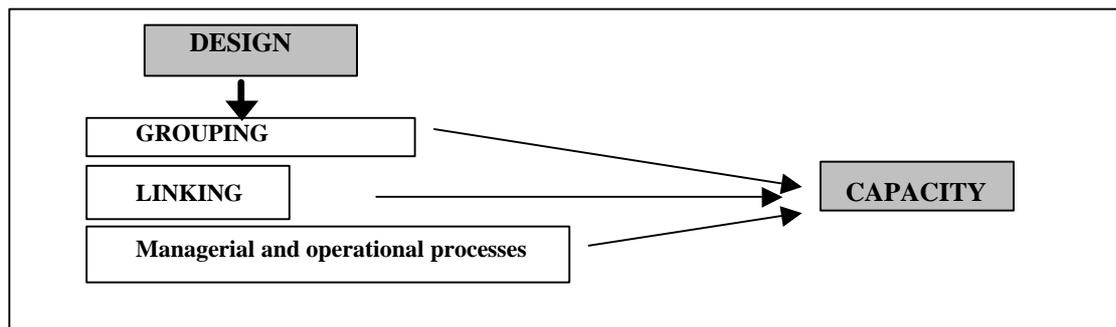
Figure 4 : Information Requirement



Capacity for handling information

The elements, above-described, characterize the environment to which organizations face. The organizational design aims at developing the sufficient capacity for handling this informational requirement.

Figure 5 : Design, capacity for handling information



For Nadler and al (1988), the design is elaborated in three phases. It is firstly necessary to **group** the individuals in work units, which have to work together. Then, these various groupings must be bound by mechanisms of **coordination**. Lastly, other **managerial and more operational mechanisms** can be used in order to facilitate and to control the information processing. These three stages form the discussion thread, which we will use to describe the possible choices of organizational design. We will see thereafter, mechanisms proposed by the various contingency authors to divide, bind and manage the organizational tasks.

Adjustment between information capacity and requirement

An organization has to be ensured that the capacity of the design to process information corresponds to the amount of information required by the environment. The strategies elaborated by the managers have to look after their correspondence if they want to prevent a severe decrease in performance.

The hospital environment knows major changes, which modify the information requirement. It is so interesting to wonder whether the organizational choices, actually used, still develop an information capacity adapted to the requirement.

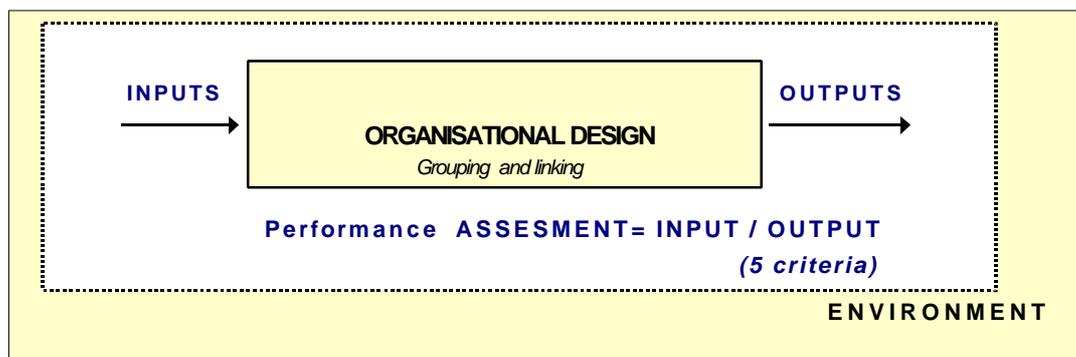
Let us look at now how the contingency authors define the concept of organizational design.

Organizational design

The organizational design is "the making of decisions but the formal organizational arrangements, including the formal structures and the formal processes that make an organization " (Nadler and Tushman, 1988). For Daft (1991), the design is the formal tasks assigned to the organizational individuals and departments, including the lines of authority, the responsibilities, the number of hierarchical levels, the degree of control of the managers and the coordination level. The organizational design mainly determines the way in which the organizations work. It is a powerful tool that managers can use in order to improve how organizations operate (Nadler and Tushman, 1988).

Nadler and Tushman (1988) add that an indissociable link exists between design and performance. According to them, any manager should ideally evaluate to which performance it can expect given his design choices. Nadler and Tushman (1988) define the design as the process by which the organizational resources are transformed into outputs. Since the performance is declined at once in terms of inputs use and in terms of obtained outputs (Section 0), we easily understand the indissociable link between performance and design (Figure 6). The design affects at once the organizational behavior and performance.

Figure 6 : Design, transformation process of inputs in outputs (Crêteur, Pouplier, Pochet et Closon, 2000)



For Lawrence and Lorsh (1973), the organizational design is based on two elements: the degree of differentiation and the degree of task coordination.

The **differentiation** consists in organizing each sub-task in order to facilitate their execution. Mintzberg mentions the work division, Nadler and Tushman (1988) speak about aggregation and grouping. Various choices, related to the design, indeed aim at determining how to group the different roles, how to incorporate the various positions in work units, called divisions, departments or teams. This grouping of individuals facilitates their communication and the execution of their tasks, but creates barriers with the other groups.

In order to facilitate the communication between divisions, the design must also ensure the **integration** of the sub-tasks in order to execute the total task (Lawrence and Lorsh, 1979). According to these authors, an appropriate system of integration depends on the number of new products and the level of predictability of the organizational tasks. Other authors (Galbraith, 1979; Mintzberg, 1983; Nadler and Tushman, 1988; Daft, 1991) mention the coordination mechanisms. Mechanisms should be developed in order to coordinate the work of the various units and to bind the various groups.

The organizational design meets two essential purposes: to facilitate the information flow in the organization in order to reduce the uncertainty of the decision-making process and to reach a powerful coordination and integration (Duncan, 1979).

Grouping

To group is the first stage to realize to design an organization. The functions, the positions and the individuals are aggregated in work units. This stage is the most critical because it determines the basic organizational architecture (Daft, 1991). The organizational design implies to allocate the rare resources in order to realize economies of scale, profits of specialization and integration (Duncan, 1979; Nadler and Tushman, 1988). We describe the three principal types of groupings: functional, divisional and matrix. Table 4 (p : 21) gives a synthesis related to these three grouping types, their main characteristics, their representation, their strengths, their weaknesses and a discussion concerning their possible application in hospital.

Functional Structure

Very close to the functional structure, Obel and Burton (1998) propose another structural form: the simple structure. This consists in a direct relation between the top manager and the workers. The coordination and the decision-making are ensured by the top manager. This one can very quickly be overloaded and to be unable to face the amount of information to be handled.

This structure is not easily applicable to hospitals. Their size is too large and they handle a too important amount of information.

As the amount of information to be processed increases, the number of exceptions increases and the hierarchy becomes overloaded. It is then necessary to find new mechanisms. Tasks have to be specialized, rules and standard procedures have to be elaborated. The hierarchy intervenes then only in the exceptional situations. The simple structure changes into a *functional structure* (Galbraith, 1979; Obel and Burton, 1998).

The functional departmentalization is realized from the activities or the operator skills and competencies or finally from the technical constraints (Nizet and Pichaut, 1995). Workers are thus gathered in departments by common competencies and by discipline. For Daft (1991), the grouping is realized around the organizational resources.

In this structure, decisions are generally centralized (Mintzberg, 1979; Duncan, 1979; Obel and Burton, 1998). According to Galbraith (1973), this structure is related to mechanistic organizations, using exclusively the vertical flows of information. The dominant information flow tends to follow the hierarchy. The vertical differentiation (the number of hierarchical levels) is generally high (Mintzberg, in Nizet and Pichaut, 1995). Rules and policies are specified .

The degree of formalization is generally high (Galbraith, 1973; Obel and Burton, 1998). This structure ensures an optimal resource use, economies of scale and functional excellence. However, such a structure lacks of reactivity and of flexibility to the customer requirements and does not develop a sufficiently global view of the organization. Coordination between various disciplines is also difficult. As the number of products increase, the coordination problems increase and the needs for information increase. The functional structure is no more likely to be adapted.

Belgian hospitals are traditionally organized in a functional way in order to ensure task specialization and thus high knowledge, so important for the various disciplines of the hospital. But coordination problems between the functions become higher and higher and the amount of information to be handled becomes continually larger. It is then interesting to wonder whether new grouping mechanisms should not be elaborated.

Duncan (1979) and Galbraith (1973) consider the functional structure as one of the simplest structures. For these two authors, this configuration is able to handle a limited amount of information. When the information requirement increases, other mechanisms should be installed. However, several strategies permit to keep a functional grouping.

- *To decrease the amount of information to be handled and to increase the capacity of information processing by means of rules, hierarchy and planning:*

As we above-mentioned, the simplest method, to face to an increase of information requirement, is to elaborate strategies that employees must follow, the hierarchy intervenes in situations of exceptions (Galbraith, 1973). When complexity increases, the number of exceptions increases and the hierarchy becomes overloaded.

Another solution is to set objectives, results or quotas that have to be reached. Instead of setting rules or procedures that have to be followed, the leaders' role is to determine the objectives that have to be achieved and employees determine the strategies that they follow to concretize them.

However, as the task uncertainty increases, these strategies do not suffice any more and other solutions should be developed.

The majority of hospitals have many rules that the staff has to follow. This standardization process does not seem however to be reconciled with the need for autonomy of the employee and with the uncertainty and the complexity of the patient flow.

- *To decrease the amount of information to be handled by creating slack resources:*

These strategies decrease the amount of information that has to be treated. Stocks are increased, deadlines are decreased or the standards of performance are decreased. This slack resources allow to reduce the task complexity, the degree of interdependence between tasks and to maintain a centralized decision-making process (Galbraith, 1973). The use of slack resources may have nevertheless a certain cost and may decrease the degree of customer satisfaction.

A hospital can thus increase the length of stay, create safety times in consultations scheduling or to create additional stocks or equipment. In the past, the use of these slack resources was enough generalized. The retrospective payment system for Belgian hospitals encouraged to increase stocks or to increase the patient length of stay because it implied additional payments. The amount of required information was consequently less important. Now, the situation is completely different. The costs of such a strategy become too important and this solution seems no more adapted.

- *To increase the capacity of information handling by developing the information systems.*

To be able to treat a larger amount of information and to make additional decisions, an organization can engage a greater number of people, add programming teams or invest in a more complex information system. As the creation of slack resources, this strategy permits to keep a centralized decision-making. It is necessary to evaluate the cost of this investment in comparison with the benefit that this one is likely to generate.

The hospitals have to gather an amount of information continually larger (in Belgium, Minimum clinical summary, minimum nurse summary, Finostat). The setting of the needed equipment, the hiring of additional workforce and the creation of a centralized information system suppose the realization of large investments.

- Remark: *lateral relations.*

Another strategy permits to increase the capacity of information processing. It concerns the development of the lateral relations (Galbraith, 1973). We will come back to these integration mechanisms later because they are related to all the grouping strategies.

Divisional structure

Divisions are created around the products or the services (or products and services groups) , or around the customers or markets, or finally, around the geographical areas (Galbraith, 1973; Mintzberg, 1979; Nadler & Tushman, 1988; Daft, 1991; Obel & Burton, 1998). Various competencies, rather than the same competencies, form the basis of the departmentalization (Daft, 1991). This is appropriate for organizations for which technology is divisible, where economies of scale are not important (Obel and Burton, 1998).

The departments are relatively autonomous contrary to the functional configuration. The objective of such configuration is to minimize the interdependence between groups (Obel and Burton, 1998). It consists in dividing a large problem in smaller sub-problems. The amount of needed information with these small problems is smaller than the needed amount to solve a large integrated problem. This structure decreases thus the amount of information that has to be handled (Galbraith, 1973).

The top manager is very few implied in tactical and operational problems (Obel and Burton, 1998). It is rather a decentralization strategy (Duncan, 1979; Mintzberg, 1979; Obel and Burton, 1998). Mintzberg (1979) adds that the divisional structure generally goes in couple with a weak vertical differentiation (the number of restricted hierarchical levels).

The divisional structure ensures flexibility, reactivity and a greater attention to the customer requirements. This structure ensures a multidisciplinary view and a strong coordination between the disciplines. It has nevertheless weak points. The economies of scale related to the resource consumption are difficult to obtain. The resources are bought for various divisions, without possible sharing between them. In similar structures, the risk of resource duplication is very present. Specialized technical skills may lack in certain fields. The employees are concentrated indeed only on a particular product, without being able to increase their expertise on other products.

In a hospital, traditionally functional, we can imagine that it might be advantageous to create services centered on a particular pathology. The division (or services) takes care of the complete patient flow. Some services work already in a quasi-autonomous way in some Belgian hospitals. In Canadian hospital, the organization by project is more and more generalized. This organization is very similar to the divisional structure. It seems to achieve good results. The so-called “*hospital-within-hospital*” (Jonas, 1998) is receiving quite a bit of attention. “*Hospital services are designed to provide patient focused care. The hospital’s activities, resources and personnel are organized around the hospital’s strategic business units by bringing together related clinical product lines. The traditional tripartite vertical structure in the hospital , medical services, nursing services and administrative, support services is thus replaced by a collaborative management team for each designed patient care unit.....It remains to be seen whether this kind of organization achieves some important changes in how the hospital operates and deliver patient care*” (Jonas, 1998).

Matrix structure

This structure contains two lines of hierarchy. It incorporates simultaneously the characteristics of the functional configuration and the divisional configuration (Galbraith, 1979; Daft, 1991; Nadler and Tushman, 1988; Obel and Burton, 1998). It permits to increase the capacity of the organization to process information. The matrix configuration is used when the needs for coordination are so large that a traditional functional organization is not effective or when the interdependencies between products are so strong that a divisional configuration is inefficient.

The matrix structure ensures coordination between the departments, flexibility and the reactivity to the customer requirements, that the functional organization does not manage to achieve, and ensures an efficient use of resources and economies of scale, that the divisional configuration does not make possible to achieve. The matrix form permits to combine the advantages of both structures that we above-defined.

This grouping, at once focus on the functions and the offered services, supposes nevertheless a double line of authority which is not easy to implement and which is likely to generate many conflicts. Daft (1991) adds that the success of a matrix structure mainly depends on the workers' ability to face to a double role and to a double level of authority. Moreover, managerial skills are essential. Coordination is finally very complicated and costly in terms of time, money and information exchanges.

The matrix structure is very attractive for many hospital managers because it combines their two main objectives. Thanks to an input orientation, it ensures an optimal use of the available resources by avoiding their duplication and their under-utilization. Focused on a particular pathology, it ensures a global and effective patient process view. Managers hesitate however to implement such a matrix structure because the coordination costs are high and because the sharing of authority is not obtained without difficulty.

Fetter (1991) argues for the use of a matrix structure for the hospital medical and administrative staffs because *"its captures the concepts of product line management in operational terms. Department heads oversee the conversion of inputs for a given product line while physicians manage the bundling of these intermediate output. A matrix can be developed to assign responsibility and accountability to those responsible for providing patient care, management being responsible for the **efficient** delivery of intermediate products and physician being responsible for their **effective** utilization"* (see page **Erreur! Signet non défini.** in Table 3).

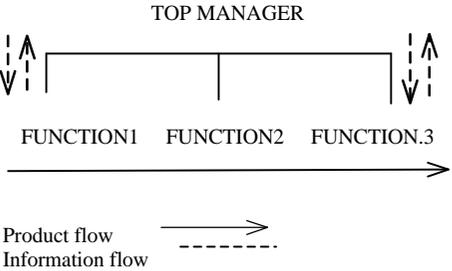
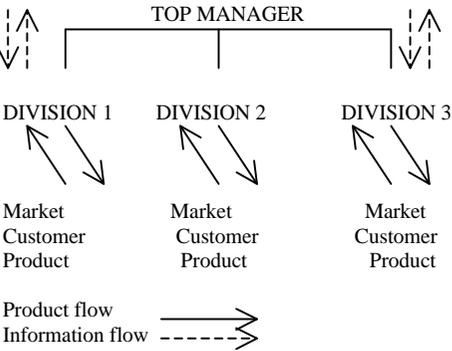
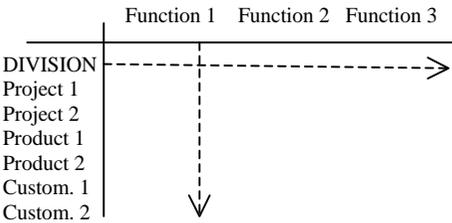
| GROUPING | REPRESENTATION | ASSESSMENT | HOSPITAL APPLICATION |
|--|---|--|---|
| <p>Functional structure</p> <ul style="list-style-type: none"> • Input departmentalization • Strong formalization • Centralization • Vertical differentiation <p>Potential Adjustment when the uncertainty grows :</p> <ul style="list-style-type: none"> • Standardization, rules • Slack resources • Vertical information systems |  | <p>Strengths</p> <ul style="list-style-type: none"> • Economies of scale • Optimal use of resources • Functional excellence • Functional innovation • Easy Control of the functional actors • Direct Control of the <i>top management</i> • Excellent coordination inside the functions <p>Weaknesses</p> <ul style="list-style-type: none"> • Costly Integration and difficult communication between the functional departments • Conflict risk between the disciplines • Slow Response to the market requirements • Inertia risk, Brake on innovation • Loss of global view of the organization • Lack of clearness of the responsibilities | <p>This structure is traditionally used by the hospitals. Task specialization ensures strong knowledge of the various disciplines, critical in hospitals. Such a structure does not seem to be sufficiently adapted because of important coordination problems</p> |
| <p>Divisional structure</p> <ul style="list-style-type: none"> • Output departmentalization • Rather strong Formalization • Decentralization • Horizontal differentiation |  | <p>Strengths</p> <ul style="list-style-type: none"> • Strong reactivity and flexibility to the market requirements • Easy innovation • Multi-disciplinary and global visibility • Development of global and multidisciplinary skills • Easy integration and coordination between functions by product / service and reduction of the amount of information to be processed between the divisions • Clear Responsibilities <p>Weaknesses</p> <ul style="list-style-type: none"> • Control loss of the top manager • Risk of resource duplication and efficiency loss • Less reactivity to disciplinary changes, less functional innovation, loss of technical specialization opportunities | <p>This structure could be used in a hospital. Some hospital services are already almost autonomous.</p> |
| <p>Matrix structure</p> <ul style="list-style-type: none"> • Input and output departmentalization • Weak formalization • Centralization et decentralization |  | <p>Strengths</p> <ul style="list-style-type: none"> • Focus on resource use and on market → Market flexibility → Efficient resource use • Development of global and functional competencies • Interdisciplinary coordination and access to an important expertise • Varied tasks for the workers <p>Weaknesses</p> <ul style="list-style-type: none"> • Double authority line, source of conflict • Complex, costly and slow coordination because of important information requirements • Strong instability | <p>Hospital managers are very attracted by the matrix structure that combines their two main objectives:</p> <ul style="list-style-type: none"> • To use at best the available resources and in the same time to avoid their duplication and their under-utilization (“input” orientation). • To take care of patient and ensure a global view of his hospital stay (“output” orientation). <p>But coordination costs are important and the authority share is difficult.</p> |

Table 4: recapitulative table: grouping strategies – representation, assessment and hospital adaptability.

Linking

We described various departmentalization strategies around resources and outputs. We saw that these groupings raise coordination problems between various disciplines for the functional structure and inside the same discipline (distributed on several divisions) for the divisional structure. In this part, we present a continuum of *various coordination mechanisms*, from the simplest to the most complex, that an organization can use to mitigate these integration problems.

Duncan (1979) defines the organizational design as "*a model of interactions and coordination that links the technology, tasks and human components of the organization to ensure that the organization accomplished its purpose*". In this definition of the design, Duncan insists on the importance of the integration mechanisms. Those are, structural or not, devices that encourage contacts between individuals in order to coordinate the work of two units (Mintzberg, 1979). According to Nadler and Tushman (1988), formal links have to be developed in order to facilitate, to encourage, and to improve coordination between distinct groups.

Figure 8, inspired by Brown (1999), synthesizes the various forms of lateral relations found in the literature. Galbraith (1973) is the first to have proposed a continuum of horizontal mechanisms (Brown, 1999). According to him, these mechanisms allow to increase the organizational capacity to process the information. It is important to see that the mechanisms which offer a better horizontal information processing are the most expensive, in terms of time, energy, efforts and money (Nadler and Tushman, 1988). The direct contacts between managers offer a modest improvement of coordination but are not very expensive to implement. The more formal mechanisms, like the integration roles, ensure a better coordination but are also more expensive because they suppose to hire part-time or full time employees to act as integrators. To choose the most appropriate integration devices, an arbitration between effectiveness and cost should be realized.

For some authors (Galbraith, 1973; Mintzberg, 1979; Nadler and Tushman (1988)), the matrix form is the most complex form of lateral relations (Figure 8). It represents the most intense form to obtain a joint resolution of problems and a shared responsibility. Even if the matrix structure implies to develop the most complex coordination mechanisms, we prefer to consider the matrix as a grouping form, as Galbraith (1994, according to Brown, 1999), Daft (1991) and Obel and Burton (1998) did. We consider then, that before becoming matrix, the functional and divisional organizations can choose among a continuum of lateral relations (Figure 7).

Figure 7: lateral relations and functional, divisional and matrix structures

| GROUPING | LINKING | GROUPING | LINKING | GROUPING |
|-----------------------------|---|--------------------------|---|-----------------------------|
| <i>Functional Structure</i> | → <i>Lateral relations development</i> | <i>Matrix structure</i> | ← <i>Lateral relations development</i> | <i>Divisional Structure</i> |
| INPUT ORIENTATION | | INPUT/OUTPUT ORIENTATION | | OUTPUT ORIENTATION |
| | → | | ← | |

Informal mechanisms, as task turnover, formations, interpersonal practices, support the communication and the co-operation between the work units. Mintzberg (1979), Galbraith (1992) and Nadler and Tushman (19979) insist on the importance of these devices. We prefer however to limit us to the formal mechanisms in order to be consistent with our design definition, as various formal mechanisms. Later, in our search, we will try to introduce these informal devices. Inspired by Nadler and Tushman (1988), we retain three main categories of formal coordination mechanisms of coordination. Figure 9 schematizes each of these mechanisms.

- **Liaison roles:** in each department, a worker is responsible for the improvement of the information and coordination flows between the units. The liaison role is not a full-time responsibility but is rather realized in combination with other activities.
- **Liaison groups:** in opposition with the liaison roles, the liaison groups mobilize a more important number of workers and provide a large forum in order to exchange information, to coordinate and solve the conflicts. In these liaison groups, workers combine their integration role with other activities.

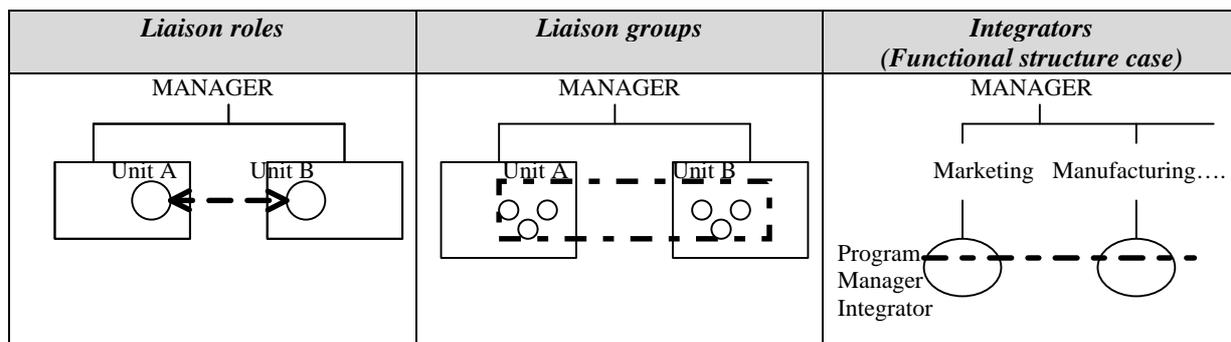
- Integrating roles / departments:** if the situation requires to make decisions, which affect several departments, the first two mechanisms can be insufficient. Integrators can then be hired. These integrators work full-time for this role. They are responsible for helping the various departments to achieve common tasks related to a particular project. The integrator has the advantage to not belong to any department, which confers on him a neutral position to solve conflict.

Figure 8: Continuum and assessment of lateral mechanisms (Inspired by Brown, 1999)

| AUTORS | PERFOR-MANCE | GALBRAITH 1973 Lateral mechanisms | MINTZBERG 1979 Mechanisms based on interpersonal relations | NADLER TUSHMAN 1988 Structural Linking | DAFT 1992 Coordination Mechanisms | GALBRAITH 1994 Lateral organization mechanisms |
|---------------------------------|--|--|--|---|---|--|
| LATERAL MECHA-NISMS • Formal | <p style="text-align: center;">HIGH*</p> <p style="text-align: center;">↑</p> <p style="text-align: center;">↓</p> <p style="text-align: center;">LOW*</p> | Matrix Structure | Matrix Structure | Matrix Structure | | |
| | | Integrating Department Integration role Team Steering committee Liaison role | Integrating role /department Task forces and standing committees Liaison positions | Integrating role /department Cross-unit groups Liaison | Permanent groups Full-time integrators Task forces Liaison roles | Integrator roles Formal groups |
| • Informal | | Direct contacts | Mechanisms based on mental representations | | Direct contact Paperwork | Informal (spontaneous, voluntary) organization |
| *Performance 's meaning | | Low ability to handle information Low costs to organization | Low strength of modification | Low cost of implementation Low cost dependence on informal organization Low information processing capacity | Low information capacity Low degree of horizontal coordination | Low information processing capacity Low implementation cost |

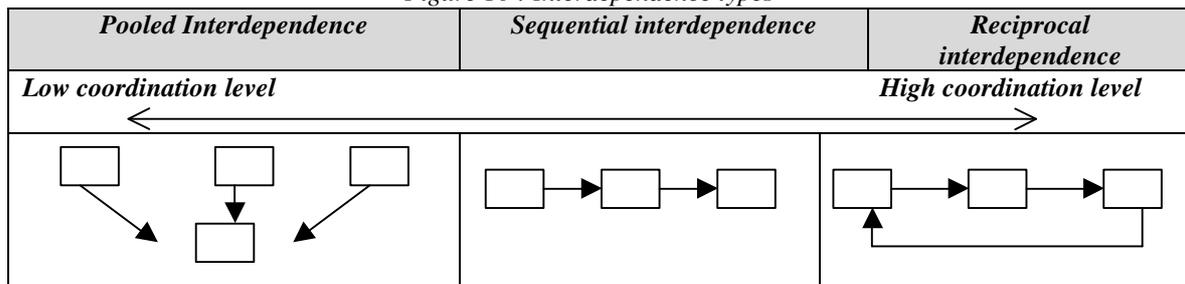
Figure 9 illustrates the close relationship between the integration roles and the matrix structure. The authority line is not yet completely double but looks almost like.

Figure 9 : Formal lateral mechanisms (inspired by Nadler et Tushman, 1988)



Nadler and Tushman (1988) distinguish three interdependence types (*Figure 10*) between the tasks, from the simplest ("*pooled interdependence*") to the most complex ("*reciprocal interdependence*"). Each type of interdependence supposes continually larger coordination level and information processing requirement. The "*pooled interdependence*" requires the simplest level of the coordination and is met when the units operate independently of each other – workflow do not pass between the units - but use a same resource. In case of "*sequential interdependence*", the outputs of a department become the inputs of another department. Lastly, the "*reciprocal interdependence*" requires the highest coordination level and capacity of information handling. The outputs of the various departments influence the other departments in a reciprocal way. These various types of interdependence can cohabit inside one organization (Daft, 1991).

Figure 10 : Interdependence types



An hospital is a very favorable place for the reciprocal interdependencies that suppose to introduce more complex mechanisms of coordination, whereas the pooled interdependencies and the sequential interdependencies can be coordinated by means of rules, hierarchy or plans. The reciprocal interdependencies require to develop more complex coordination devices as those we described – liaison roles, liaison groups, integration roles (Daft, 1991). The hospitals are consequently obliged to implement these lateral mechanisms. This raises a very relevant question inspired by Brown (1999) that consists in determining which integration mechanism is the most powerful and which combination of integration mechanism and grouping devices is the most powerful. Our objective will be to answer these questions for the particular hospital case.

Other mechanisms

The lateral structures that we above-described aim at obtaining coordination and control which ensure, on the one hand, that required information is available at the right time to make the good decision and, on the other hand, that the right decisions are made (Obel and Burton, 1998).

Galbraith (1973), Mintzberg (1979), Duncan, (1979), Nadler and Tushman (1988), Daft (1991) as well as Obel and Burton (1998) define other managerial processes that can be used in order to coordinate and to control the organizational activities: **formalization, centralization and organizational complexity**. According to these authors, certain devices are adapted for a particular structure forms (functional, divisional and matrix) (*Figure 11*). These structural correspondences are called "*design parameter fit*" by Obel and Burton (1998). We define in this part these main mechanisms.

Centralization

Centralization is the degree with which the formal authority is concentrated in the hands of only one individual or only one unit located at the higher level of the hierarchy. Centralization depends on the degree of implication of the top management in the decision-making and depends on the degree of control of the top management in the decision-making. It specifies the responsibilities for the budgets, the hiring, the firing, the control of the assessment and the rewards.

Centralization is related to the capacity to process information. As the information requirement is larger, the number of people implied in the decision-making is larger and decentralization is larger (Obel and Burton, 1998).

When we defined the various grouping mechanisms, we specified their link with the degree of centralization. The functional structure requires a rather centralized decision-making because the various

functions must be strongly coordinated. In a divisional organization, divisions are more autonomous and the decision-making is rather decentralized. The top manager especially is involved in the strategic decisions but less involved in the operational and tactical decisions. The degree of centralization is fuzziier for the matrix structures. (Galbraith, 1973; Mintzberg, 1979, Duncan, 1979; Nadler and Tushman, 1988 Daft, 1991; Obel and Burton, 1998).

Formalization

For many organizations, to obtain a standardized behavior of the members improves performance. Formalization is one of the means to achieve it. Formalization ensures the coordination and the control of the activities (Obel and Burton, 1998). The intensity of formalization is often measured from the number of written and formal documents such as the rules, the written task procedures or descriptions (Daft, 1991).

Formalization decreases the information requirement on the one hand and increases the capacity of data handling on the other hand (Galbraith, 1973; Obel and Burton, 1998).

Formalization is generally relevant in a functional organization. The number of written rules or procedures to be followed is there important. In a divisional configuration, a great number of rules can be observed but it varies much from one division to another. Formalization is less significant in the matrix configurations (Galbraith, 1973; Mintzberg, 1979; Daft, 1991; Obel and Burton, 1998).

Organizational complexity

Organizational complexity (Mintzberg, 1979; Obel and Burton, 1998) depends mainly on two criteria.

- The larger the ***horizontal differentiation*** becomes, higher the number of units or departments is (Mintzberg, 1979). This creates additional costs because it increases the needs for coordination and the amount of information that has to be processed (Obel and Burton, 1998).
- ***The vertical differentiation*** depends on the number of hierarchical levels between the "top management" and the bottom of the hierarchy. It increases the coordination and information processing costs (Mintzberg, 1979; Obel and Burton, 1998).

Obel and Burton (1998) add a third type of complexity, the space differentiation. This one depends on the number of sites for the facilities and the personnel. This complexity increases the amount of information that has to be handled. Obel and Burton (1998) however moderate it because thanks to the modern techniques of information exchange, the space differentiation is made easier. Thus, we retain primarily the horizontal differentiation and the vertical differentiation to define complexity.

The larger organizational complexity is, the more difficult coordination is and the higher the amount of information, which has to be processed, is (Obel and Burton, 1998).

According to Mintzberg (1973), the adoption of one departmentalization form corresponds to the choice of a more or less high differentiation. Moreover, Obel and Burton (1998) reinforce it.

The output departmentalization supposes close relationship of workflow and thus a low vertical differentiation. The input departmentalization solves problems on the highest level of the hierarchy, far away from the workflow. Vertical differentiation is there high (Mintzberg, 1979).

The divisional form supposes a high horizontal differentiation, moreover often expensive. The functional structure develops a low horizontal differentiation. It realizes economies of scale by concentrating certain functions and by stimulating the interactions between specialists in close disciplines (Mintzberg, 1979).

Figure 11: Correspondence between the grouping mechanisms and different managerial processes (inspired by Obel and Burton, 1998)

| <i>PROPRIETIES</i> | <i>Functional Structure</i> | <i>Divisional Structure</i> | <i>Matrix Structure</i> |
|--|------------------------------------|---|--|
| <i>Centralization</i> | Centralization | Tactical and operational decentralization Strategic centralization | ? |
| <i>Formalization</i> | A lot of rules | Very variable number of rules | Less rules |
| <i>Horizontal Differentiation</i> | Medium to low (+) | High (++) | Middle |
| <i>Vertical Differentiation</i> | High (++) | Medium to low (+) | High (++) if the functional side is more important |

BUILDING OF A SINGLE GLOBAL MODEL and FUTURE RESEARCHES

We defined the concept of hospital performance and provided criteria to evaluate it: efficiency, financial results, the patient satisfaction, and the quality of care and human resources. We defined the concept of organizational design. We considered organization, as a process of information handling and the design as the mean of developing the capacity of information needed to answer the information requirement resulting from the environment. Three main structures and their characteristics were highlighted: the functional structure, the divisional structure and the matrix structure. Each of them gathers activities around a particular mode, centered on the inputs for the functional structure, on the outputs for the divisional structure or finally on both simultaneously for the matrix structure. The first two structural forms raise coordination problems and a continuum of integration mechanisms was defined: liaison roles, liaison groups and integration roles. The matrix structure supposes to develop the most complex integration mechanisms. We thus have a typology of seven possible designs.

A single global model

In future research, we would like to integrate these various designs and their impact on performance in a single global model. *Figure 12* schematizes this purpose. The existing literature analyzing the relationship between performance and structure often considers only one dimension of performance and design. For instance, authors use only profit for performance or only information system to describe design. The originality of this future research would be to integrate this existing literature and its partial contribution in a single global model.

The model will translate the above-mentioned “macro” designs into “micro” behaviors of hospital agents in critical decision processes (strategic negotiation for resource allocation and operational decision related to the patient test scheduling). This translation in operational terms is essential to understand and to explain the impact of design on performance. Each combination of design and decision process implies indeed particular behaviors and responsibilities for each agent, specific vertical and horizontal information flows. In this single global model, we will integrate the contribution of the contingency authors and to other authors that are interested in modeling behaviors of (hospital or not) agents and their impact on performance (Baligh & Burton, 1981, 1984; Malone, 1987, 1988; Kumar, Ow & Prietula, 1993; Levitt, Thomsen, Christiansen, Kunz, Jin & Nass, 1999; Carley and Prietula, 1998, 1999 and Carley, 1998, 1999). This conceptual model will help us to understand better the impact of the organizational design on hospital performance and will allow us to develop several hypotheses that we would like to test in real hospitals context.

Simulation and contextual analysis

Simulation will be a powerful tool to develop our global understanding of hospital institutions. Our goal will consist to simulate the various modeled designs, which hospitals can choose, and to analyze their impact on hospital performance. Simulation is a relevant tool to virtually manipulate the independent variables (environmental parameters and design choices) of our model and to observe the effects of these manipulations on the dependent variables (dimensions of hospital performance). Simulation is indeed “*often used to describe the organizational behaviors and often obtains good results*”(Cohen and Cyert, 1965). Forester (1980) insists on the usefulness of simulation to describe the system dynamic that are too complex for mathematical analysis. Levitt et al. (1999) argue that “*model-based simulation best represents the dynamic behavior of actual complex organizations because relevant objects – activities, participants, messages, meetings – from the real world are specifically represented by corresponding software objects with defined properties and behavior in the model*”. According to Kumar et al (1993), simulation is “*a plausible method of incrementally constructing, testing and validating theoretical constructs with respects to alternatives....We can explore the effects of our designs on the organizations which they must realized*”.

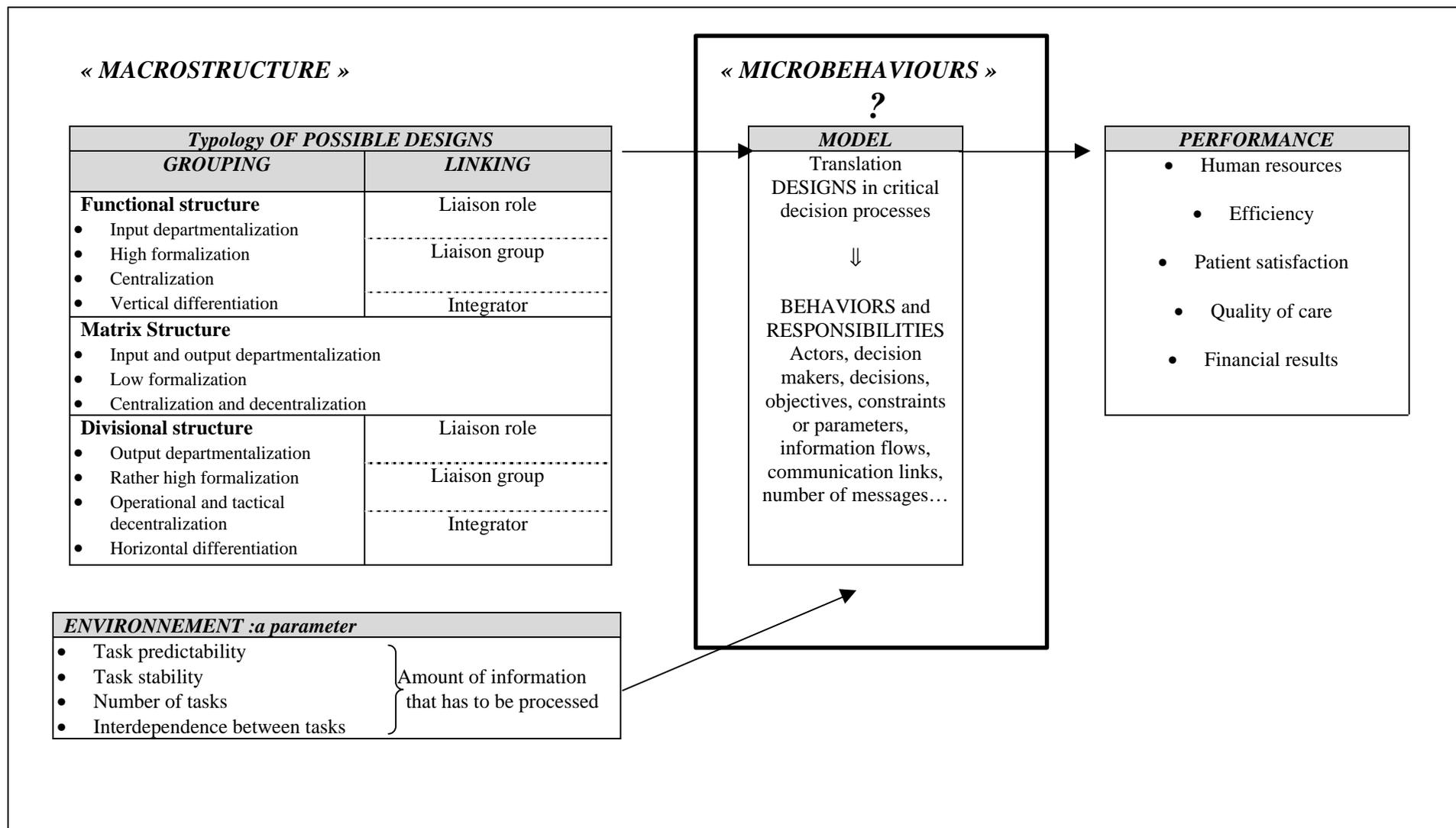
The organizational performance of each design will be the simulation outputs. Their analysis will permit to us to make interesting comparisons between the various designs. To realize the same simulations with some parameter change will be interesting. It allow us to take account the random character of the patient flow: requirements, service time, inter-arrival rate, ...Sensibility analysis will

determine if the performance outputs obtained for each design change or do not change for varying parameters.

A contextual analysis will ensure a higher validity of our model (Croom, 1996). Our goal will be to compare one or several real organizational situations and decisions with the simulated cases of our model. We may find rival explanations for performance and/or confirm the hypotheses from our simulation model. Moreover, we could simulate the decision processes with data of a real hospital and determines the influence that could have alternative designs on his performance. Such a research could lead to interesting managerial recommendations for hospital structures.

These analyses (simulation, contextual analysis) will be helpful to refine our model of organizational design, that will be closer to the real decision processes and should lead to a better understanding of the impact of organizational design on performance.

Figure 12: Single Model of organizational design and hospital performance – Purpose of our future researches



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