

Performance Monitoring Systems in Healthcare Organizations

The Managerial Perception of Uncertainty in Volatile Environments

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Abstract

Monitoring performance in healthcare organizations appears evolving drastically over time, due to a continuous search for better quality, efficiency and timeliness. As a result, the usefulness of traditional management/performance control systems in such organizations is questioned and a focus is then made on the context in which each organization is operating.

In a contingent-based perspective, a limited number of qualitative and quantitative empirical studies examine how some major contingent variables (nature of the organization, size, structure...) influence both the managerial decision-making process and the management control process in healthcare organizations. But, while largely integrated in other managerial contexts (Kabwigiri and Van Caillie, 2000), most of them ignore the variable “uncertainty” and how uncertainty is perceived by managers in healthcare organizations.

So, the prime interest of our empirical study is to appraise how uncertainty is appraised by managers in volatile environments. To investigate this subject further, we rely on seminal studies that link between the influence of the organizational attributes (structure, size, level of technology), and their effect on the managerial decisions-making (personal profile and perception) of a suitable management control system (MCS).

Our methodology rests on a “qualitative comparative approach” of thirty case studies, lead in two heterogeneous environments (Belgium and Lebanon). Such method allows us to validate our theoretical framework with qualitative case studies collected via semi-structured questionnaire. Our findings provide us with a dialogue between a single (in-depth) case study exploring the phenomenon and a qualitative comparative approach. Thus, we gain understanding of the causal mechanisms and processes, as well as of the core determinants of the healthcare managerial adoption of performance monitoring systems (PMS).

Introduction

Seminal studies in management consider the managerial perception of uncertainty in volatile environments as a contingent variable influencing the choice of an adequate management tool (Gul, 1991; Fisher, 1998). These studies deal with the complexity, turbulence (Boyne, 2002) and uncertainty (Provan, 1987) of the external environments. It details the influence of some external factors on the development of organizational structures.

Our research applies to the healthcare organizations in particular. After centuries as small-scale, private entities, these organizations have grown explosively, as knowledge has been gained and applied. They have contributed to a better health. But, their contribution could be greater if their managers can implement adequate performance monitoring systems (PMS).

Numerous external mutations and environmental incidents are affecting the internal organizational climate. From a macro-economic perspective, nations (despite their diversity) struggle upon an increase of health spending at a faster rate than the national wealth (Nolte et

al., 2003). The reasons point out to some social, cultural, political, technological, economic and competitive environmental mutations (Provan, 1987). These constraints have generated an uncertain, complex and turbulent environment (Boyne, 2002).

Once these factors occur, the cycle of an institution is disturbed (Healy and McKee, 2002); hence, healthcare managers must take actions to correct deviations. They aim to satisfy three divergent approaches: a “customer”, an “economic” and a “budgetary” one (Boeker and Goodstein, 1991; Bouillon, et al., 2006). However, it appears that creating an autonomous (self-governed) hospital remains a difficult task for those managers (Gittell and Weiss, 2004).

To investigate this subject further, we rely on seminal studies that link between the influence of some organizational attributes and the managerial decision-making of a suitable management systemⁱ. In particular, we rely on the contingency theoryⁱⁱ of leadership that simply argues that “*the success of the leader is a function of various contingencies in form of subordinates, tasks, and/or group variables*”. His behavior and decision-making are contingent upon a complex situation and an organizational context (Vroom and Jago, 1988).

In the traditional hierarchical organization, Adair (1983) sees the role of the leader as composed of three overlapping duties. These are: achieving the task, building and maintaining the team, and developing the individual. However, achieving an appropriate balance is not an easy task (McGregor, 1993) in volatile environments. Confronted to complex situations, some managers seem to lose, by far, the sight of the big picture and focus solely on specific goals. They depend on some traditional tools that don't support their monitoring processes of healthcare strategic objectives.

Consequently, healthcare managers implement several processes and systems to manage and stimulate organizational performance (Gul, 1991). Over time, they reveal greater need for monitoring processes when they perceive environmental uncertainties. They tend to promote then their traditional tools towards the contemporary PMS, such as the Balanced Scorecard (Kaplan and Norton, 2006), to appraise their organizational performance.

In the interim, they embark on an internal organizational context, manipulated by multiple stakeholders (external authorities and internal personnel). Hence, healthcare managers seem confronted to some unique challenges that limit their preferences. These refer to organizational adjustments, to technical barriers (Signolet and Nobres, 2007) preventing performance appraisals, to matters of agreed priorities between stakeholders, and/or personnel “humanistic” perceptions (Burgelman, 2002; Merchant, 1998).

In fact, the transition of the healthcare environment has emphasized the development of some healthcare networks (Gittell and Weiss, 2004), generating vast amounts of information. In response to these arrangements, healthcare managers evolve their organizational divisions towards formalized structures (D'Aunno and Zuckerman, 1987). They also promote their database systems to achieve integrated levels of Patient Care (Burns et al., 2002). It depends then on the organizational size and updated technological level (Hailey and James, 2003) to reach a formalized organizational structure. Hence, healthcare managers implement sophisticated IT platforms as primary step for promoting their managerial systems.

However, healthcare managers do not directly serve a single group with ultimate authority, like a shareholder group (Burns et al., 2002). They do respond to numerous external constituencies (the community at large) who do not often agree together (conflict of value and interests creating goal ambiguity). Those external groups manipulate the adequate (economic) resources (Rushing, 1974) that are required to sustain the PMS's implementation.

On the other hand, healthcare managers encounter internal professional behaviors that might affect their decision-making and competencies (McConnell, 2004). They tackle among the most serious internal issues that: affect the quality of work, decrease the potential

revenues and generate a stressed and dissatisfied workforce (Bourgeois, 1985). Accordingly, healthcare managers ought those stakeholders' consent and commitment to promote the existing traditional tools.

Hence, healthcare managers are accountable for the extent of centralizing the decision making and the range of the managerial decisions (McConnell, 2004). Their personal profiles and competencies (Provan, 1987) feature then their abilities and leadership styles (Thompson, 1967): to promote a participative managementⁱⁱⁱ (emphasizing communication and collaboration) and to adapt an adequate organizational structure^{iv}. A hospital is powerful then if his manager succeeds to adopt complex forms of managerial processes.

Building on this theoretical background and previous contingent models, we adapt Burton and Obel's variables (1998) to test whether or to what extent the following contingent factors: (a) the healthcare authorities; (b) the organizational life-cycle and stage of development; (c) the organizational size, (d) the complex level of technology, and (e) the managerial profile and (f) perception of uncertainty, limit his selection of contemporary management systems.

Sample and methodology

In research to date, a limited number of qualitative and quantitative empirical studies address this issue. For this purpose, we dedicate this empirical study to appraise the healthcare managerial perception of uncertainty in volatile environments (Lenz and Engledow, 1986). We suggest a "parallel" analysis in two heterogeneous environments: two contrasted national healthcare contexts that are characterized by the divergence of the social, cultural, political, technological and economic factors.

To collect our data, we have developed a semi-structured questionnaire that identifies the management control mechanisms and tools in use within healthcare. We have addressed this questionnaire to 15 Belgian and 15 Lebanese healthcare organizations^v. We have then requested the administrators' collaboration in an in-depth case study research. Following a series of phone calls, we have scheduled our appointments in June 2008 in Belgium and January 2009 in Lebanon. We have held our meetings with the general and/or the financial managers. In few cases, we have met the controllers and/or the medical managers.

Our first methodology rests on describing a single case study that explores the phenomenon. According to Gerring, (2007), we can "*gain better understanding of the whole by focusing on a key part*". Based on this single (in-depth) case study, we can recognize the causal mechanisms and processes, as well as the core determinants of the managerial perception and adoption of contemporary PMS. We can "explore" our conceptual framework and build a contingent model. However, we will not consider the managerial behaviors following this single "observational" case. Accordingly, we will simply use it to explain the broader phenomenon that we are addressing.

In order to solve these paradoxes, we alternate subsequently the standard linear model that is adapted in a single analysis to "generalize" and "replicate" our results (Georges and Bennett, 2005, p.325). Hence, we establish a more variegated set of multiple case-studies to capture the complexity of our phenomenon and to understand the similarities and differences between the cases (Yin, 2003). We adopt then an ongoing process that goes beyond the gap of the qualitative/quantitative methods. Hence, we use the "*qualitative comparative approach – QCA^{vi}*" (Ragin, 1987) to assess different healthcare organizational contexts.

We adopt then these two methodologies (single case study and QCA for small N analysis) to link between the concept of monitoring performance, the managerial perception and decision-making in volatile healthcare environments. Though, we note that combining these

two methods to investigate the manager's role is not a common theme^{vii}. However, Gerring (2007)^{viii} suggests thinking of them as complements. Furthermore, Rihoux and Lobe (2009) extend their interpretations and suggest that a dialogue can exist between the QCA small-N scale and the "thick" case evidence. The authors believe that one cannot construct a case study without at least thinking about a broader set of cases. Accordingly, we consider that the single case's results can synthesize the outcomes of the cross-cases analysis, and vice-versa.

Results and discussion

Single case study exploring the phenomenon:

Our single case refers to a private general/university hospital. This organization has overcome critical crossroads since its establishment. It has undergone expansions, renovations, diversification of the delivered services and even boards' alterations. Despite the private status, this hospital complies with governmental regulations. These regulations affect the internal policies and emphasize the promotion of the traditional management systems.

The administrative manager, in charge of this task, has adopted a first step towards evolving the traditional MCS. He has implemented an accounting system to transform the clinical view to an administrative image of production, highlighting the safety and quality of care. Accordingly, he has organized the medical, surgical disciplines and medico-techniques into processes that aim to look after the patients. Hence, he has developed a formalized internal structure that interlinks the departments and centralizes the healthcare services.

Following this first step, the administrative manager has adopted the Balanced Scorecard (BSC) to monitor performance. He has implemented it to achieve a cost/effective management that combines the economic and non-economic (quantitative and qualitative) measures of performance. He has relied on this PMS to create a balance of the short and long-term objectives, the financial and non-financial measures, the lagging (outcome) and leading indicators of performance, and the internal and external constituents of the organization.

He justifies that some other factors have supported his choices of adopting a PMS. He refers to a strong commitment of the owners and board of directors; to the evolution of the hospital's life-cycle and its influence on the organizational structure; to the increasing size of beds and the diversification of the delivered services; to the need for easy access of information and the complex level of technology (deployed via an internal management information system); to his personal profile and decision-making style (his personal knowledge of the BSC); and to the support and devotion of his administrative team.

This brief overview of our single in-depth case validates then the role of the healthcare manager and highlights his perception of uncertainty in volatile environments. It reveals that his perception of a high level of uncertainty strengthen then his choice of a PMS. However, the emergence of the role of the various players in healthcare exceeds the framework of this paper. We limit then our analysis to their complementary influence on the choice of the PMS in hospitals. Accordingly, we focus on our original hypotheses and we integrate the previous mentioned variables (listed in the review of previous literature) in a QCA. We aim, in the following, to validate this exploratory study on a boarder universe of healthcare organizations.

Comparative (multiple) case studies analysis: results and interpretation

We adopt the *qualitative comparative approach* to associate the qualitative variables of our analyzed cases with quantitative combinations. We then list all the possible combinations of variables, in terms of presence (1) or absence (0). Hence, we use the qualitative approach (by

our intimate knowledge of the cases) and the quantitative approach to translate the cases' parameters into comparable operational variables (De Meur and Rihoux, 2002).

Presentation of our samples: our data is collected in two heterogeneous environments. Hence, we suggest comparing both samples where we distinguish three sets of hospitals:

The first regroups eight hospitals (BA, BE, BI and LA, LB, LH, LI, LJ). Their healthcare managers use the traditional management systems (such as budgeting, strategic plans, financial mechanisms, etc.) and rely on the financial indicators (to estimate the budgets and measure some performance indicators). They measure and control the organizational performance by means of permanent dialogue between the departments. Hence, they rely on some abstract mechanisms, of personal and cultural nature, to monitor performance on a monthly, quarterly and/or yearly frequency.

Those managers argue that their choice of promoting the traditional processes is restrained by several factors. They refer to a lack of technological platforms (providing an easy access to information), to an informal organizational structure (as result to recent mergers), to a purchasing department controlling the quality, to a lack of top-management commitment and awareness of the PMS's concepts (mainly the BSC). They also highlight the governmental role (outdated regulations) and the healthcare authorities' devotion to a legal mission.

The second regroups ten hospitals (BG, BJ, BM, BN, BO and LC, LD, LF, LG, LK). Their healthcare managers acknowledge the evolution of the traditional management systems towards the management accounting processes. They aim to monitor the internal organizational performance and the quality of care. Hence, they adopt the Activity-based costing/ Management, the Casemix measurement system, and/or the Clinical Audit, etc. as interactive instruments. In some cases, healthcare managers have mentioned that their tools are deployed on internal database systems allowing the interpretations of statistical figures.

Those managers highlight that the development of their traditional tools was possible because of the presence of a technological platform (to integrate additional qualitative data such as, the patients' medical records, the physicians' schedules, etc.); and/or, their collaboration with other hospitals that have adopted similar accounting systems or PMS. They also refer to the managerial perception of an increased need to focus on patients' care, and to communicate and coordinate between the departments. Hence, they aimed to deploy a restructuring policy of the healthcare activities (the adoption of a value chain management).

The third regroups twelve hospitals (BB, BC, BD, BF, BH, BK, BL and LE, LL, LM, LN, LO). Their healthcare managers attest the use of the contemporary strategic tools such as, the BSC, the Benchmarking, the Total Quality Management, or the EFQM. They also admit achieving "alignment" between their organizational strategies and operational management. However, those managers point out to some deficiencies in the implemented management information systems. They state that their actual IT platforms in use do not support the integration of some clinical data, in specific departments (Laboratory). To solve this issue, they rely on clinical information processes by means of abstract mechanisms^{ix}.

QCA proceedings: The first stage of our analysis consists of identifying the dependent and independent variables. In our context, the "outcome" variable is the managerial choice of a management system (**MS**). It is explained following three possibilities, as discussed in the dimensions and scope of the management systems (Pock, 2007). Hence, we assign three values [(0), (1) and (2)] for this "outcome":

- a "0" value for the traditional **MCS** that are based on the financial indicators;
- a "1" value for the **MAS** that integrate some progress figures and frequent statistical reports to create an interactive internal management;
- a "2" value for the **PMS** that link between the strategic and operational indicators.

We also define our “conditions” variables and their assigned values:

a) *The hospital’s stage of development (SD)*: Based on some suggested models by Gray and Ariss (1985) and Quinn and Cameron (1983), we designate “1” value to this variable when the healthcare manager adopt an organizational structure to reach a “stage of formalization and control”; or “0” value when the organizational structure is still informal (“the hospital is a place to treat illnesses”).

b) *The organizational size in number of beds (NB)*: when we ought to quantify this variable, we find that the applicable threshold to healthcare organizations lack in previous references. We also note, out of our samples, that the PMS were deployed at department, organizational and network levels. Thus, we relate the organizational size to professionalism^x. In this perspective, we consider that small and medium hospitals – less than 300 beds^{xi} – deliver specialized services. Hence, we assign the “0” value for the specialized hospitals; and the “1” value for general, university and hospitals that are members of a network^{xii}.

c) *The complex level of technology (IT)*: we assign the “1” value when a healthcare manager implement a complex management information system (Burns et al., 2002; Currim et al., 2006); or, the “0” value this IT platform doesn’t provide timely access to information.

d) *The manager’s profile and decision-making style (MP)*: we assign the “1” value when the manager has an administrative profile^{xiii} (or he has attended executive training seminars or he has collaborated with a management team); and the “0” value when the manager has a non-administrative background and experience (physician, technician, and/or religious).

e) *The manager’s perception of uncertain environments (MPU)*: we assign a “0” value when the manager perceives a low level of uncertainty; or a “1” value when he perceives a high level of uncertainty requiring the integration of a risk management dimension.

Following, we replace our qualitative data in two binary tables representing the 30 **Belgian** and **Lebanese** cases. Tables 1(a/b) display then the “outcome” (**MS**) and the “conditions” variables (**MP**, **MPU**, **SD**, **IT**, and **NB**), as well as the observed cases (explained by rows). Following, we carry-on the algorithm equations with TOSMANA (TOol for SMALL-N Analysis software) version 1.3. We exploit its additional feature of Boolean Minimization: the Multi-Value Minimization^{xiv}.

Belgian Cases	MP	MPU	SD	IT	NB	MS
BA	1	0	0	0	0	0
BB,BF,BK,BL	1	1	1	1	1	2
BC,BD,BH	1	1	1	1	0	2
BE	1	0	0	0	1	0
BG	0	1	1	0	0	1
BI	1	0	1	0	0	0
BJ	1	0	1	0	1	1
BM	1	1	1	0	0	1
BN	0	0	0	0	0	1
BO	0	1	1	1	1	1

Lebanese Cases	MP	MPU	SD	IT	NB	MS
LA,LB,LH,LI	0	0	0	0	0	0
LC	1	1	1	0	1	1
LD,LG	0	1	1	0	0	1
LE,LM	1	1	1	1	0	2
LF,LK	0	1	1	1	0	1
LJ	0	0	1	0	1	0
LL,LN,LO	1	1	1	1	1	2

Tables 1(a/b). The truth tables, created with Tosmana, regrouping the 30 case studies.

QCA results and discussion: Following eight minimizations, TOSMANA’s equations provide us with different paths explaining every outcome. The equations (odd suggestions with and without logical remainders)²⁷ highlight the role and profile of a healthcare manager and his relevant choice of adopting a management system. Our first four minimizations combine several variables to justify the choice of management control or management accounting systems (Outcomes “0” and “1”).

It reveals that the adoption of a management control or a management accounting system in Belgian hospitals is contingent upon the managerial perception of a low level of uncertainty [MPU{0}] AND/OR the organizational lack of a technological platform [IT{0}]. As for the Lebanese hospitals, it is contingent upon the managerial perception of a low level of uncertainty [MPU{0}].

Nevertheless, these findings cannot be generalized and does not lead us then to validate our results. In fact, it does not provide us with feasible solutions to solve the contradictions

between cases ($B1a \cap B0a = B1b \cap B0a \subset B1a \cap B0b = B1b \cap B0b$). Therefore, we reject

previous induced formulas (out of four minimizations). We pursue our analysis and we assume that not much dissimilarity between combinations and cases affect the managerial choice of a traditional management control or management accounting system.

In the subsequent calculations, we recode the “outcome” management system in a new variable (MS_01), assigned by: “0” value for the adoption of a management control or accounting system; and “1” value for the adoption of a performance monitoring system and we elaborate a new truth table. We then proceed with TOSMANA’s minimizations. Our observations lead us to seven Belgian (BB, BF, BK, BL+BC, BD, BH) and five Lebanese (LE, LM + LL, LN, LO) cases where their managers have adopted the PMS.

These organizations have attained a formalized stage of development [SD{1}], AND are managed by an administrative [MP{1}] who is perceiving a high level of uncertainty [MPU{1}] AND who is supported by the implementation of a sophisticated information system [IT{1}]. In particular, our findings highlight the managerial administrative profile [MP{1}] AND the presence of a sophisticated IT platform [IT{1}]. These two key factors underline the healthcare managerial choice and adoption of a PMS when perceiving environmental uncertainties in healthcare organizations.

On the other hand, it shows that for eight Belgian and ten Lebanese healthcare organizations, the managerial choice of promoting the traditional tools is restrained by a non-administrative profile [MP{0}] OR a lack of sophisticated IT platforms [IT{0}]. It also leads us to analyze the intersection between both findings to find an empty literal. Accordingly, we validate our results out of this “parallel” comparison between two contrasted environments. We also recapitulate our general findings in the following table 2.

Sample: 15 Belgian and 15 Lebanese healthcare organizations.		
Methodology: a single case study and a qualitative comparative approach.		
Contingent variables and hypotheses	Findings	
	Single case study	QCA
a) The organizational life-cycle and stage of development: <i>the hospital’s stage of development is evolving towards formalized structures and is emphasizing the adoption of the contemporary</i>	- Evolution of the life-cycle and influence on the hospital’s structure.	Formalized structure.

<i>performance monitoring systems.</i>		
b) The organizational size: <i>the hospital's size is not a critical factor determining the choice of a performance monitoring systems, based on the scorecards' implementation in healthcare.</i>	- The size gradually increases with the hospital's expansion and the diversification of the delivered services.	Same findings, valid factor.
c) The complex level of technology: <i>healthcare managers need an easy access to a vast amount of information; hence, they implement sophisticated IT platforms to sponsor the monitoring tools' choices.</i>	- The presence of a management information system providing an easy and timely access to the information.	Valid and key factor.
d) The managerial profile: <i>healthcare managerial profile and decision-making reveal his choice of a performance monitoring system.</i>	- Manager's profile, autonomy and the presence of an administrative team.	Valid and key factor.
e) The managerial perception of uncertainty: <i>the manager's perception of uncertainty in volatile environments leads him to adapt a performance monitoring system.</i>	- Depends on his profile and administrative competencies. - Depends on his autonomy. - Depends on the presence of a sophisticated management information system.	Perception of a high level of uncertainty.
**The healthcare authorities: <i>the choice of a performance monitoring system depends on the healthcare authorities' consent, approval and commitment.</i>	- Commitment and Consent. - Administrators' autonomy. - New variable to be considered.	Not Valid. (Consistency assumption).

Table 2. Single case study and a QCA approaches: summary table of our hypotheses and findings.

Conclusion, limitations and future research

In research to date, a limited number of qualitative and quantitative empirical studies examine the nature of the contingent variables that influence the managerial perception of uncertainty and his relative choice of a management system. Moreover, it is still unclear if a hospital can afford to promote his traditional tools in response to uncertainty.

Dedicated to this subject, we rely on the contingency theory of leadership to appraise the managerial perception of uncertainty. We also opt for a single explorative case and a parallel comparison to complement, generalize and validate our findings. We gather our empirical data via a semi-structured questionnaire. We address this questionnaire to general and financial managers in two heterogeneous environments.

The in-depth “mere” case study describes the complexity of our phenomenon. It provides us with a better understanding of the causal mechanisms and processes, as well as the core determinants of the managerial adoption of PMS. However, this single case does not generalize nor replicate our framework.

We establish then a more variegated set of multiple case-studies. We standardize our data samples to present the “conditions” (contingent) variables and the “outcomes” (the choice of a management system) characterizing our cases. We use Tosmana software to elaborate the algorithm's formulas that describe the paths for each outcome. Our empirical findings highlight that the choice and elaboration of a management system (management control, accounting system or performance monitoring system) in healthcare context does not follow the same pathway. It differs between cases and organizational contexts.

On the subject of management control and accounting systems, our findings reveal that in the Belgian healthcare sector, there is not much dissimilarity between the healthcare organizations that are adapting these traditional tools. Moreover, our primary analyses identify several combinations of conditions that emphasize the traditional tools' promotion

towards the choice of a MAS. In particular, it indicates that the choice of an accounting tool is contingent upon the manager's profile, his perception of uncertainty and the absence of a complex management information system.

Moreover, our results illustrate similar pathway for the elaboration of a performance monitoring system in both heterogeneous environments. It points out to the managerial administrative backgrounds and the presence of a sophisticated management information system as key factors sustaining the choice and elaboration of PMS. Accordingly, both findings help us to "modestly" validate our results. Our future research suggests analyzing the external environmental constraints and the major role of the healthcare stakeholders, mainly the healthcare authorities.

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Footnotes

- ⁱ We examine the managerial perception of uncertainty in volatile environments with respect to the assets and limits of the traditional tools. So, we do not neglect that a healthcare manager can rely on the traditional MCS to exhibit alignment between the organizational strategy, structure and technology; but, we assume that these managers are confronted to environmental constraints limiting their choices.
- ⁱⁱ One of the major strands of organizations is the contingency theory. It simply argues that there isn't a single best way of organizing; instead, the management of a firm depends on several contingency factors such as the complexity of the environment, the strategic positioning of the firm, or the technology in use (Galbraith 1977). It rests on the assumption that a fit among some "contextual, structural and strategic factors" will yield to a better monitoring of performance than will a misfit (Doty et al. 1993, p. 1196).
- ⁱⁱⁱ A healthcare manager controls the inputs (resources) and handles the outcomes. He tackles among the external risks and internal problems. These mutations affect the quality of care, decrease the potential revenues and generate a stressed and dissatisfied workforce. He must excel then among some internal processes (solutions) that can respond to his appraisal of the external environment and internal organizational climate.
- ^{iv} Several empirical contingency-based studies underline then the assumption of creating an appropriate "fit" between a company's context, its strategy and its management control system (Chenhall and Langfield-Smith, 1998; Perera et al. 1997). However, these studies lack in healthcare context.
- ^v According to Javeau (1990), a minimal threshold of 30 participants can "modestly" generalize our findings
- ^{vi} The QCA approach stands for an approach and a technique for small-N samples. As an approach, it considers, in a very explicit way, a dialogue between the facts and the (theoretical) ideas. As a technique, it mobilizes the Boolean algebra to compare several variables from a small. It elaborates a mixture of combinations of several factors leading to the same outcome. Hence, it can predict similar or contrasting results (Yin, 2003, p. 47).
- ^{vii} Researches to date classify the qualitative analysis in two categories: either single case study or large scale cross-analysis case studies.
- ^{viii} In his book, the author proposes a case and cross-cases' studies to compare between: the research goals (hypothesis, validity, causal insight, scope of proposition), the empirical and the additional factors.
- ^{ix} Their adoption of a strategic PMS doesn't exclude then the implementations of some other traditional MCS.
- ^x According to Nehauser (1966), the type of operations effect on the hospital's size and relatively on its management control tools.
- ^{xi} Although some of our hospitals having less than 300 beds are members of networks, where the network policy is relevant to specialized locations and to centralized administrations.
- ^{xii} We neglect the private/public status and its influence on the choice of a management system given that there isn't much accounting divergence between the hospitals in the Belgian healthcare sector.
- ^{xiii} Inspired by the studies of Stone (1990) and Young, Charns and Shortell (2001).
- ^{xiv} Tosmana reproduces another representation of our samples, by combining the identical cases. It generates then a data matrix that is displayed by the truth tables. As a result, it contributes a "parallel" comparison within the cases and between the national healthcare contexts.
- ^{xv} These formulas set the possible combination of variables leading to the choice of an outcome. It associates the healthcare organizational attributes, the managerial decision-making and the choice of a management system. Moreover, the replicated minimizations by outcomes consider the "Simplifying Assumptions" as proposed by Tosmana. It includes the logical remainders (combination of conditions that are not gathered via our empirical cases) and reproduces the "short" formulas that highlight the key variables inducing the outcomes.

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