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Information for Managerial Decision-Making in Healthcare : Suggest steps to achieve abalance between information insufficiency and information overload : Literature review

Information pour la prise de décision managériale en santé : Vers l'atteinte d'un équilibre entre l'insuffisance et la surcharge informationnelle : Revue de la littérature

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Abstract

The diversity of information flows existing in organizations, the considerable proportions that they can take and above all the importance of remaining open to them, expose Managers to a risk of information overload. Faced with this problematic, we set out to answer the following two questions: 1) Are these flows easily manageable ? 2) Is it possible to achieve a fair balance between information insufficiency and overload ?

To this end, we conducted a multidisciplinary literature review. The result shows that these information flows are rich, diversified and almost unmanageable, and that the risk of overload is very real. Also, a precise measurement of this informational balance is doubly difficult : mainly because we are in an area where quality predominates and also because the capacity of Managers to process information, while limited, remains variable between people.

Furthermore, we propose a three-steps approach to tend towards this "balance": Become aware, on a daily basis, of the potential risk of information overload and be attentive to its warning signs; Give priority to the quality of information; and above all develop the Managerial skill of "detection of relevant information".

Keywords : Informational Balance ; Decision Making ; Hospital.

Résumé

La diversité des flux informationnels existants dans les organisations, les proportions considérables qu'ils peuvent prendre et surtout l'importance d'y rester ouvert, exposeraient le manager à un risque de surcharge informationnelle. Devant cette problématique, nous avons entrepris de répondre aux deux questions suivantes : 1) Est ce que ces flux sont gérables ? 2) est-il possible d'atteindre un juste équilibre entre l'insuffisance et la surcharge informationnelle ?

A cette fin, nous avons mené une revue de littérature pluridisciplinaire. Le résultat montre d'abord que ces flux informationnels sont riches, diversifiés et quasi-ingérable et que le risque de surcharge est bien réel. Aussi, une mesure précise de cet équilibre est doublement difficile : principalement du fait qu'on se trouve sur un terrain où le qualitatif prédomine et aussi parce que la capacité des managers à traiter l'information, toute en étant limitée, reste variable entre les individus.

Par ailleurs, nous proposons une démarche en trois temps pour tendre vers cet « équilibre » : Prendre conscience, au quotidien, du risque potentiel de la surcharge informationnelle et être attentif à ses signes avant-coureurs ; accorder la primauté à la qualité de l'information ; et surtout développer la compétence managériale de « détection de l'information pertinente ».

Mots clés : Information ; Décision ; Equilibre informationnel ; Hôpital.

Introduction

In many fields of science and research (Biology, Organizational Science, Cybernetics, etc.), it is clearly recognized that all living systems need information to survive. Among other things, this information enables them to understand their environment and adapt to it (Guyot, 2002).

At the organizational level, information also remains a vital element, and its use can improve decision-making as well as the organization's performance and competitiveness (Arash et al., 2013). This calls on managers and decision-makers to put in place a system that will ensure the availability of the right information in a time frame they deem appropriate. However, in trying to avoid information shortage or insufficiency, Managers must avoid leaning towards the other extreme, so as not to find themselves managing an information overload.

Indeed, information overload, also known as infobesity, can overwhelm a manager's ability to process and exploit information. Information overload can also have negative consequences, both for the manager, in the form of psychosocial risks, and for the organization (risk of misinformation linked to the deterioration in information quality, effects on productivity, etc.). (Vulbeau, 2015).

Thus, if information is essential for the survival and development of organizations, its profusion, the increase and the diversity of its flows can have harmful effects for both the organization and the Manager. And the problematic therefore concerns this paradox that the hospital Manager must resolve: Taking advantage of the opportunities offered by the development of data, networks and organizational information flows, while avoiding information overload and its risks. Hence the objective of this manuscript which deals with the optimal and harmless exploitation of information.

Our research questions are therefore :

- Can the hospital Manager easily manage organizational information flows? Or is the risk of information overload really present?
- Will the Manager be able to achieve the right balance between information insufficiency and information overload?

This research takes place in an international context requiring organizations, whether public or private, to be even more efficient and responsive. A context which promotes collegiality and interdisciplinarity and which is characterized by the development of both IT infrastructure and networks. And what results is inevitably a considerable increase in circulating information.

At the national level, the situation is similar since the Kingdom of Morocco has opted for years for the modernization of public administration, among other things, through its computerization

and dematerialization of procedures. And the health sector was one of the pioneering sectors in this area.

Indeed, the Kingdom of Morocco has begun an overhaul of the national health system through the implementation of a deep and lasting reform. And it turns out that one of the pillars of the reform concerns the digitalization of the health system and the implementation of an integrated information system.

This manuscript therefore aims to highlight these information flows, to prevent the risks of overloads that they can induce and to contribute, modestly, to the operational implementation of these major projects.

And in order to meet the assigned objectives, we will first specify the methodology that we have adopted. Then, we present the result of our literature review structured in four parts: Generalities and definitions relating to "information"; Formal information flows (related to internal control, information systems, and economic intelligence); Informal flows; and Information overload. Finally, in the analysis and discussion section we present recommendations in favor of achieving « informational balance ».

1. Methods

Information is omnipresent in organizations. Essential to the design, implementation and monitoring-improvement of any activity, it can also take different forms. Furthermore, it is the center of interest of several disciplines and fields.

Therefore, in order to answer our research questions while taking into consideration the specificities of "information", we opted for a multidisciplinary approach. This is justified by the fact that to make decisions and whatever their profile, the hospital Manager is confronted with these different characteristics of organizational information : a diversity of forms (reports, dashboards, messaging, rumors, etc.) and of nature (financial, accounting, quality, management, etc.). This is why, and without claiming to be exhaustive, we have approached it through the lens of various disciplines, including Information Management and Information Systems, Managerial Work and Behavior, Internal Control and Economic Intelligence.

Furthermore, we dealt with the notion of information overload; this while specifying that we have not found or accessed research that directly addresses this notion of "informational balance".

Also, in order to exploit both relatively old reference articles as well as current events on the subject, this non-systematic review covered a relatively long period of time.

2. Results

In the healthcare sector, hospital management implements an "Internal Control" system to provide the necessary guarantees that the hospital is running smoothly and meeting its objectives. This control comprises several components, including information. For this reason, the manager will set up a "formal" information system to provide feedback on production, the quality of services provided, the optimized use of resources... At the same time, to remain reactive and, why not, proactive, the manager must remain vigilant to changes in the environment. And the business intelligence system he implements will be the source of information that is vital to the survival of his organization.

These two sources of formal information, internal and environmental one, risk generating an unmanageable flow of information. And yet, they do not include all the information circulating within the hospital. In fact, information that maybe highly relevant and valuable may circulate in the informal information network, in the form of friendly discussion, rumors, e-mail... And this is another additional, quite substantial, and inescapable flow of information to be taken into consideration and managed.

It's not hard to imagine that, given these diverse and considerable flows of information, and considering the many other demands placed on hospital managers daily, the risk of information overload is very real and obvious.

2.1. « Information » : Generalities and Definitions

Defined as "man's view of the world", information is immaterial and subjective, and has no interest or meaning unless it is confronted with other views, and there foreshared (Michel, 2001).

In addition to being a necessary element in the adaptation of systems to their environment, and therefore to their survival (Guyot, 2002), information remains indispensable for learning. Indeed, it has been argued that motor learning, by way of example, is intimately linked to available and interpretable information. Thus, learning can not take place in the absence of information, and will be delayed in the presence of too much or too little information. In addition, an optimal amount of information must be available, which differs according to the individual's skill level and the difficulty of the task to belearned (Guadagnoli; Lee, 2004).

The AFNOR definition (AFNOR, 1998) highlights the difficulty in accessing it: “Data(s) acquired from a source” and which can be white, gray, black or critical information; and this by increasing degrees of difficulty to access it.

One classification of information distinguishes between three levels of information (Guyot, 2012): Information intended for the activity and without which the latter cannot be carried out correctly; Information produced by and around the activity; and finally, the activity of searching for relevant information.

Furthermore, information processing poses four classes of problems relating to (Dubois; Prade, 2001): Its useful formatting; its storage, restitution, and exploitation; its use in decision-making and action; and its communication.

We also refer to the notion of "Information Management", which has three components: surveillance, monitoring, and intelligence (Depauw, 2006).

Despite different definitions and classifications, information remains present in all human activities (Guyot, 2012). However, information presents a two fold problem. On the one hand, the manager is faced with an accumulation of data, while the relevant information is drowned in the mass (Drucker, 2005), leading to information saturation (Simon, 1983). On the other hand, this data is generally routine, rarely geared towards decision-making and action (Drucker, 2005); Hence, the challenge of being able to find relevant information easily, and so the need to organize it.

2.2. Formal information

The formal information network is deliberately set up (Simon, 1983). Its mechanisms are multiple, and the information it produces is varied in nature, ranging from the strategic to the operational. As a result, the quantity of information that emerges can be impressive.

As we are unable to cover all the sources of formal information and related concepts, we propose to focus on three of them: Internal Control, Information Systems and Economic Intelligence.

2.2.1. Internal control

Internal control constitutes the overall organizational foundation that situates the functions essential to organizations, including those relating to information.

Internal control is indispensable to organizations, guaranteeing efficient, controlled operations. It concerns individuals, assets, and information alike (Yahia, 2014). Its aim is to provide reasonable assurance (Bernard et al., 2010) that operations are carried out and optimized, that financial information is reliable, and that laws and regulations are complied with.

It is a risk identification process designed to ensure ongoing control of activities. It is subdivided by COSO into 5 parts (IFACI, 2013): Management, information and communication, control

activities, risk assessment and the control environment. These five components correspond to 17 underlying principles (Berge; Jordan, 2013).

Within this construct, we can clearly distinguish the importance given to information; this through, among other things, the development of control activities, at the origin of information flows, and the broadening of the scope of information systems (Ki-zebro, 2013), notably beyond financial reporting (Villepelet, 2013) (Zupan, 2013).

2.2.2. The Information System

The information system has very specific objectives that distinguish it from other closely related concepts (Satyanarayana et al., 2009). It is made up of three interacting components (GUYOT, 2012): These are actors organized to achieve objectives, rules, methods and procedures to be respected, to which a technical device maybe added. This whole requires monitoring and evaluation (Farah, 2014). It "makes it possible to pool information belonging to separate sources" (Leitzelman; Dou, 1998).

Moreover, as the mass of information to be managed has grown, and the need for flexibility and sharing in its various manipulations has increased, the trend has been towards the integration of information systems. This has led to the emergence of integrated software packages or ERPs (Enterprise Resource Planning) (Arcis, 1999). These consist of a set of application modules working on a single database and covering different areas (accounting and financial management, management control, production, purchasing, etc.).

The introduction of ERP indirectly induces organizational change, since the adoption of a cross-functional approach, rather than a hierarchical vision of the company, is a key element in the successful integration of information (El amrani, 2008).

Despite the nature of the system adopted and in relation to the use of "data", it is important to beaware of three basic rules (Kennerley; Mason, 2008). The first is that the database and the data stored within it are the result of human activity and should not be considered as fact or reality. The second is that the context and initial purpose for which the information was collected significantly affect the data and its interpretation, and it is therefore advisable to take precautions when using it for another purpose. The third and final rule is that, to improve decision-making using data and information, the mental model of the decision-makers and those reflected in the data should be closely aligned with the entity concerned by the decision.

2.2.3. Economic intelligence (EI)

To be competitive and gain a competitive advantage, decision-makers need to be able to process data quickly to make informed decisions; and Economic intelligence (EI) is a decision-support

tool that will enable them to reduce uncertainty, understand the competition and therefore make their decisions less uncertain. (Ouchekkir et al., 2021).

EI can be defined as "all the coordinated actions of research, processing and distribution, with a view to its exploitation, of information useful to economic players" (AFNOR, 1998). But it is above all a state of mind (Mallowan, 2014)

EI is based on three functions: informative, anticipatory, and proactive, and lies at the crossroads of four major fields: information products, tools for group work and information sharing, Benchmarking, and economic espionage (Favier, 1998). Its main contributions (Gloaguen, 2014) concern, among other things, the control and protection of strategic information, the production of information by involving collaborators, and viability thanks to a high-performance, responsive decision-making system.

Conceptually, the various approaches to EI are based on four main trends, including economic competitiveness (Bulingue;Moinet, 2013). And its objective is not limited to the accumulation of information but extends far beyond this to its exploitation through knowledge, for action (Moinet, 2009).

In this way, EI goes far beyond the framework of monitoring, "a continuous and largely iterative activity aimed at actively monitoring the technological, commercial or other environment, in order to anticipate its evolution" (AFNOR, 1998), which is considered too passive (Favier, 1998).

At company level, EI reflects the company'sability to anticipate production problems, as well as the skills needed to solve them (Colletis, 2007). In fact, there is a certain convergence among companies in the way they define and implement an EI approach (Levet, 2002).

At the territorial level, we have seen the extension of EI into various fields, including public management, in favor of a systemic approach to the territory and entrepreneurial attractiveness. (Zeryouh;Daabaji, 2022)

On a national scale, EI "defines a situation characterized by the systemic exploitation or revelation of actors' potential for complementarity, with a view to increasing economies of variety or diversity" (Colletis, 2007). It has been developed in several countries. However, the historical and cultural foundations that gave rise to it differ from a country to another (Commissariat général au plan, 1994).

In some countries, such as France, EI is the subject of a legal framework, a specially dedicated government department and implementation tools (Délégation interministérielle à l'intelligence

économique, 2012 and 2014). As a result, it is a highly individualized public policy (Moinet, 2009).

In Morocco, the architecture for implementing intelligence and IE comprises two types of structure (Redouaby; Lafrem, 2020). On the one hand, we have specialized IE organizations, such as the Royal Institute for Strategic Studies, the Center for Economic Intelligence and Strategic Management, the Moroccan Institute of Strategic Intelligence, etc., and several ministerial departments that have set up a monitoring and IE system.

2.3. Informal Information

Among the characteristics of the manager'swork, Mintzberg (Mintzberg, 2011; 2003; 1984 and 1971) highlighted managers' preference for informal and verbal communication. And subject to a few specificities, the said preference has been confirmed for the hospital manager (El idrissi & al, 2014) (El idrissi & al, 2015).

Thus, between 60 and 90% of a manager's work is done verbally. Similarly, he or she tends to favor informal communication (hearsay, rumors...) and interpersonal contacts because of their richness in non-verbal aspects of communication.

As a result, the formal information network is supplemented by an informal network based on social relations. The latter is of equal importance to the former and may even end up being profoundly different. (Simon, 1983)

Compared with formal information, informal information is characterized by relatively easy access and a short shelf life (Da silva, 2002). And whatever the level of relevance achieved through the development of formal feedback, it has not diminished that of informal information (Pikanen;Lukka, 2014). In fact, there is no watertight partition between the two. Rather, it is interwoven in a continuum, with blurred areas in between (Pikanen; Lukka, 2014).

A considerable flow of information thus circulates in the form of rumor; this constitutes, despite its low accuracy, avaluable source of information about public opinion in the organization (Simon, 1983). In fact, a case study showed that while the company focuses on integrating data into Big-data, managers tend to focus on informal information and demand its integration into these information systems (Karoui et al., 2013). They also consider that informal communication links facilitate mutual adjustment (Marion et al., 2007).

Thus, middle-management executives are especially important in providing informal feedback to managers. The latter must not rely solely on formal accounting information systems when making decisions (Pikanen; Lukka, 2014).

E-mail has a special place in these information flows. Indeed, while there was a tendency to consider its use as informal communication, an empirical study has shown that it leads on the contrary, notably due to traceability, to a "formalization of the informal" (Meijer, 2008). Moreover, while in Mintzberg's model managers are dissatisfied with its use, more recent studies of hospital managers have shown the opposite to be true. (El idrissi & al., 2014) (El idrissi & al., 2015).

In fact, E-mail is the second most popular source of information for hospital managers, for a variety of reasons: to make up for a lack of information, to have more time to carry out work that will be formally requested at a later date, to have more details on what is required by the hierarchy, to have a global view of the organization and therefore to know what is happening in other departments in order to better situate their own activities. Hospital managers' preference for electronic messaging is constant even in ISO-certified departments. (El idrissi & al., 2014) (El idrissi & al., 2015).

2.4. Information Overload

With the deployment of E-Government, the proliferation of different applications and management software, the computerization of patient records and the reduction of the digital divide, health care systems are experiencing a considerable increase in the information and data generated and circulating. This considerable increase in the quantity and availability of information certainly has highly beneficial effects in terms of information sharing and access. However, other risks are emerging, first and foremost that of information overload.

Also referred to as "infobesity", information overload results from both internal and external factors; related to the manager's inability to control his or her information consumption and to the environmental factors (Papp, 2018).

Furthermore, perceived information overload is correlated with various factors (Buchana; Kock, 2001):

- Individual (poor prioritization, insufficient knowledge, decision-making style, cognitive limitations, lack of concentration, lack of organization, management style, anxiety, cognitive load, otherfactors);
- Task-related (quantity, variety and quality of information, time pressure, multiple demands, technology, complexity, pace of change, competition, otherfactors).

Information overload affects the consumer's time and attention resources, as well as collective decision-making (Papp, 2018). This influences information processing: information processing increases when the decision-maker is confronted with information underload and decreases in

the case of overload. As a result, the relationship between information load and information processing is often represented by an inverted U-shaped curve (see Fig. 1.) (Hwang; Lin, 1999).

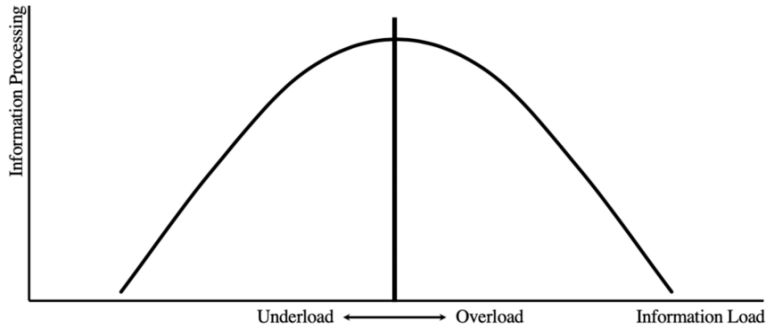

Figure 1: Relationship betweenload and information processing (Hwang; Lin, 1999)

The repercussions of information overload are twofold and can affect both individual well-being and organizational performance (Papp, 2018).

On the organizational level, infobesity generates a risk of saturation, degradation of information quality and can also alter productivity (Vulbeau, 2015). Furthermore, still within the organizational framework and in relation to information systems, the mediating role of information load in the relationship between information system quality, in-depth use of its structure and managerial performance was investigated (Roetzel; Fehrenbacher, 2019). The results indicated that information overload has a negative effect on managerial performance. Also, in relation to in-depth use of the structure of decision information systems (DIS), decision-makers are less likely to perceive information overload when using a DIS in greater depth. And finally, system quality has a positive effect on information overload since high-quality systems can encourage users to overload themselves unintentionally.

On the decision-making front, by integrating the results of 31 bankruptcy predictions, experimental research (Hwang; Lin, 1999) proved the detrimental effect of information load on decision quality. The results showed that decision quality suffers with increasing diversity or repetition of a set of informational cues or signals. Similarly, the implication for information providers is that "more" is not always "better" in the case of information.

On an individual level, hospital decision-makers and executives increasingly describe an over abundance of information that exceeds their capacity to absorb, process and classify it. (AUBIN, 2014). In this sense, it's important to point out that infobesity can be the source of psychosocial risks (stress, burn-out, anxiety...). (Vulbeau, 2015).

3. Analysis and discussion

Duringthisliteraturereviewexercise and for reasons of feasibility, the informational flows in motion at the hospitalwere not treatedexhaustively. Thus, purelymedical information was not addressed, eventhoughits influence on hospital management can take on considerable dimensions. In thissense, werecall the heavy and obvious impact of epidemiological information relating to the COVID 19 pandemic on the organizational and managerial aspects of the entire national healthcare system, leading, amongotherthings, to the strengthening and consolidation of itsresilience.

Furthermore, in relation to the first objective assigned, this interdisciplinary journey on information and information overload has enabled us to highlight, even if only partially, and confirm a number of realities; including principally: the place of information as a central pillar and cornerstone in the manager'swork as well as for organizational survival, the richness and diversity of information flows circulating in hospital structures and finally the risks of information overload on both an individual and organizational level.

Regarding the second objective, namely "how could the manager reconcile these two antagonisms and strike the right balance between information insufficiency and information overload", the answer is relatively more sensitive and less obvious.

Indeed, the exact and precise measurement of this much-coveted state of equilibrium, between informational excess and insufficiency, is difficult to obtain since we're in a field where the qualitative predominates over the quantitative. Indeed, this balance cannot be measured by the quantity of information circulating, but rather by its relevance. Furthermore, given that a summary of information presented in a way that makes it easier to assimilate will be more readily perceived by the manager, it is difficult to measure the optimal form of this information. And finally, while managers' ability to capture and process information is limited, this capacity varies from one individual to another; so that, in quantitative terms, what is an excess of information for one Manager is perfectly tolerable or acceptable for another.

However, there are several steps that can be taken to help achieve this balance. First, being aware of the precursor symptoms of information overload, of its highly harmful consequences for both the manager and the organization and refining the tools for measuring it are a considerable step towards achieving this balance. Establishing an information system, whether computerized or not, where the quality of information is paramount will also make a considerable contribution. Finally, the cornerstone of all this is the manager's ability to identify the relevant information in the flow of information. And this is a skill that needs to be acquired and reinforced through training and experience.

3.1. Be aware, daily, of the potential risk of information overload, and be alert to its warning signs.

It's widely accepted among hospital managers that the availability of, and access to, the right information is crucial to make the right decision. A lack or insufficiency of information is almost immediately perceived. It manifests itself, among other things, in a feeling of unease or risk-taking; that particularly when the manager must make an important decision. However, Information overload, is relatively less well known, and is more insidious and gradual.

We therefore believe that greater awareness, on a day-to-day basis, of its existence, its mechanisms and above all its warning signs, will help to prevent its onset, its negative consequences and to take the necessary corrective action if the problem is already present.

3.2. The quality of information is paramount

There's no doubt that the quality of information weighs heavily on the quality of the decision. Similarly, all information quality criteria must be respected and not neglected. However, it is not possible in all contexts and situations to wait for information that meets all the quality criteria before deciding. Also, it could lead to inertia.

In this sense, we estimate that three of these information quality criteria are priority, unavoidable and have to be respected in all situations: veracity, usefulness, and timely availability.

Indeed, false information can alter the relevance and quality of the decision taken. Similarly, useless or belatedly received information will not only contribute to information overload but will also be of no use to the decision or action to be taken.

3.3. Developing the skills of "detecting relevant information

Access to relevant information is not easy. This is borne out by day-to-daymanagerial practice and the literature; including the AFNOR definition of information, where we find this increasing degree of difficulty of access.

However, searching for relevant information implies first and foremost identifying and recognizing it; in otherwords, knowing what you're looking for. In this respect, we'd like to quote Claude Bernard: "who doesn't know what he's looking for, doesn't understand what he finds".

Indeed, hospitalis a component of a system, a "sub-system", of the healthcare system as a whole. And it is a complex one. So, the simplest decision taken by a hospital manager will have direct consequences, as well as heavy or light repercussions on others components of the system. As a result, a thorough understanding of the mechanisms underlying the smooth running of the

system, as well as those at the root of any malfunctions that may arise, will help to identify the relevant and decisive information to be sought and followed up.

For example, when deciding to purchase expensive X-ray equipment, hospital managers must do more than just check that the necessary budget is available, and that the equipment meets the needs of the population concerned. In fact, other information is crucial and must be sought out, including: whether similar equipment exists in the same service area, the availability of competent human resources to operate it, whether other public health priorities exist, etc. And it is the decision-makers skills, acquired through training and reinforced by experience, that will be decisive in identifying the right information to seek for making the best decision.

Quoting another example relating to the hospital information system; We all know that the system implemented can handle a considerable mass of information and can be extremely advantageous for the hospital manager, producing invaluable information for decision-making. However, it is the hospital manager who will define the information he or she is interested in, and which will subsequently be produced by the system. In fact, the design of information systems, particularly in terms of system urbanization, considers the needs of users.

And once again, it's the manager's "skill" in identifying the relevant information that will be decisive. So, for example, trying to find out the number of hospitalization days is important, but knowing the Average Occupancy Rate will give a more advanced and relatively more consistent idea of hospital productivity, and thus enable to make a better decision when the situation calls for it.

Furthermore, all management methods involving interdisciplinary, collaborative approaches, Teamwork … could certainly be beneficial for the development of this skill on an organizational scale. These various approaches would enable to develop a multi-dimensional vision and a better understanding of the mechanisms at play; and thus to identify the relevant information to be sought to make better decisions.

Conclusion

This literature review made it possible to highlight the richness of information flows circulating at the level of organizations, the information overload and its negative repercussions and to approach the notion of information balance allowing the manager to exploit the circulating information in a relevant and innocuous way: just what is necessary to avoid the risks of information overload or the discomfort of deficit.

Furthermore, the result shows that a precise measurement of this balance is difficult, for two main reasons. The first is related to information, since in this area, the qualitative predominates.

And the second concerns the manager's ability to process information; which while being limited, remains variable between individuals.

We therefore propose a three-step approach to move towards this "informational balance": Become aware, on a daily basis, of the potential risk of information overload and be attentive to its warning signs; Give priority to the quality of information; And above all, develop the managerial skill of "detecting relevant information".

Furthermore, this research has two main limitations. First of all, it is its non-exhaustiveness, since as an example and for reasons of feasibility, purely medical information was not taken into consideration; while its managerial implications can take on considerable proportions. Also, we adopted a multidisciplinary approach. And the diversified nature of existing information, ranging from external to internal, from formal to informal, from strategic to operational...did not make it possible in this context to address them in more depth. Therefore, studies addressing each flow or each source of information in a specific way would shed new light on the problem of overload.

In the same sense, we believe that it would be relevant to conduct empirical studies on the information behavior of hospital managers to try to identify the source, nature and type of information that they preferentially use in their decision-making and which would constitute a potential risk of insufficiency and/or information overload. Likewise, an empirical study, reinforcing our theoretical approach, will enrich knowledge and practices. Finally, it would also be interesting to complete and refine existing measurement tools for information overload, to include the detection of signs of insufficient information, and tend towards the exact assessment of the balance between overload and informational insufficiency.

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