

Organization chart, a methodological way to analyse the dynamic of the logistics function in French healthcare

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Communication objectives:

Given their financial weight, the different reforms made to the healthcare system in general, and to hospitals in particular, during the last two decades, have focused attention on logistics activities. These reforms have been achieved by organizational changes (for example, pooling with centralized warehousing sustained by more reactive distribution systems) and technological innovations in order to improve productivity (digitalization, automation and so on...).

In the new phase, beginning with the latest reform "My Health 2022" which highlights the coordination between sub-subsystems interacting in healthcare supply chain in order to provide patient care (city medicine, medico-social support, hospital and, even the pharmaceutical industry), interactions between patient flows and "goods" flows (pharmaceutical, medical, non-medical and so on...) become central. For these reasons, this paper seeks to analyze the place and scope of the logistics function within hospitals and the dynamic process, influenced by this new institutional context.

Research methodology

In order to characterize the logistics function within hospitals and to question the underlying rationales of their structuring, this research is based on the comparison of the organizational charts of the 32 French university hospitals. This material and singular methodology are indeed, under-mobilized by academics (Borggräfe, 2016).

Results

The results highlight the interest of using organizational charts to question the potential dynamics of the logistics function by revealing main underlying rationales. The results show that logistics is now present in all organizational charts. It also reveals a variety of configurations

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attested by diverse clusters of functions (logistics & purchasing, logistics & investment, logistics & hotel services and so on...) with specific orientations (strategical, tactical and operational) and more or less transverse objectives. A conceptual matrix, based on these configurations, captures differences and questions the function evolution.

Theoretical insights

This paper enriches the knowledge of the logistics organization in hospitals, on the underlying rationales of its structuring and dynamics. It also contributes also to an original methodological approach.

Managerial insights

The managerial findings contribute to question the role logistics can play, but also its potential place and scope in hospitals and its contribution to performance. They can help hospitals to position their organization in the matrix and to question its potential evolution in view of their organizational and institutional constraints and possibilities.

Limits

The empirical database is limited to French university hospitals and to public context. The matrix is only conceptual and must be challenged, tested and enhanced by qualitative case studies.

Keywords: Hospital logistics, place and scope of the logistics function, organizational charts analysis

ORGANIZATION CHART, A METHODOLOGICAL WAY TO ANALYZE THE DYNAMIC OF THE LOGISTICS FUNCTION IN FRENCH HEALTHCARE

Introduction

The latest reform of the French healthcare system announced in September 2018, “My Health 2022”, aims to free up medical time, to improve the efficiency and the effectiveness of the coordination between the several healthcare professionals gathering around the patient and to revise the levels of care actors expertise and intervention. The reform is based on the de-compartmentalization between city medicine, medico-social support and hospital, and even the pharmaceutical industry on the question of medicine purchase conditions, to improve the quality of care and the working conditions of professionals in the sector. By consequence, the whole organization of the healthcare system must be rethought in a transversal perspective.

The current reform thus invites the researchers to question the scope of the healthcare supply chain (including the pharmaceutical industry, hospitals and city medicine¹), which has been increasingly studied these last 10 years (Wieser, 2011, De Vries & Huijsman, 2011, Rakovska & Stratieva, 2018). This research not only questions the scope relevance, but it also considers that Supply Chain Management is a key lever that breaks down functional silos and to facilitate work across business functions, and consequently improve efficiency.

However, even if the “supply chain management” perspective reveals an avenue of savings, it remains still relevant to explore hospital logistics. Indeed, despite much research (Chow and Heaver, 1994, Landry & Philipp, 2001, Aptel & Pourjalali, 2001, Sampieri, 2000 ...), logistics remain underexploited despite accounting for 30% of hospital costs (Volland & al. 2017). There are still obstacles to logistics, which prevent faster adoption of a “supply chain management” perspective. Or, if the logistics function hasn’t reached a certain degree of maturity, any SCM perspective shouldn’t be sustainable. Moreover, the COVID-19 crisis showed the strategic role of this function to face the outbreak.

We consider that the difficulties encountered in the deployment of the logistics management are mainly organizational and human. Organizational: because logistics is historically embedded in operational activities (food, laundry...), it keeps from developing a more global organizational approach, and often acts as a major inertia factor. Human: because the competences of logistics managers can impede the evolution of the place and the role of the

¹ Local healthcare community

logistics function (Ageron et Chaze-Magnan, 2019, Sampieri-Teissier et Livolsi, 2019). In this communication, we will focus our attention on the organizational side.

The main empirical studies rely on case studies describing, as a part of results, the way the logistics function is structured within hospitals. To our knowledge, there is few transverse research on logistics or supply chain management (Aptel & Pourjalali, 2001) and no research dealing specifically with the place and the role of the logistics function in hospitals. Indeed, the most part of research is focused on a specific process (inventory management, distributing or scheduling) or invites to a holistic approach to redesign the logistics processes (Volland & al., 2017). This paper thus seeks to enrich the knowledge on this thematic by studying the logistics function in the French university hospitals centers. More specifically, it aims at defining a conceptual typology in terms of place and content and, also questioning the dynamic evolution of the function.

In order to answer the research question on the place of the logistics function, organizational charts of the 32 French university hospitals centers have been compared. This singular methodology little used by academics (Borggräfe, 2016), permits to visualize the formal lines of authority in an organization, but also shows its functional differentiation. The chart can reveal the processes of institutionalization and isomorphism (DiMaggio & Powell, 1983) as a part of the organizational identity, providing insights into how organizations visualize, present and construct themselves.

This communication is structured in four parts. In the first part, the literature on logistics within hospitals is shortly analyzed, in order to identify the scope and the difficulties to transform this function in a more transversal organization. The second part is devoted to the methodology, from the collection of organization charts to their codification and data processing. The results are then presented in a third part, before being discussed in the fourth and last part.

1. THE HOSPITAL LOGISTICS FUNCTION: A NEED TO CLARIFY ITS PLACE AND ROLE

In a first part (1.1), we synthetize the global evolution of logistics as a function and a research field. The second part (1.2) clarifies the specificity of logistics activities within hospitals. The third part (1.3) exposes et justifies the contribution of organizational charts to study the logistics function.

1.1. General evolution of the logistics function in industry

Many scholars have deeply studied simultaneously the academic field of logistics and the logistics function in organizations, to understand the evolution of its structuring (Bowersox, 2007). The observation of the place and scope of logistics highlights a form of maturity both of organizations and the field itself. The presence of the function, then its positioning and scope in the organization, show a change from a simple optimizing support function to a real strategic function in direct link with the general management, then going beyond the boundaries of the organization (towards the logistic channel).

The different management fields (marketing, finance, etc.) follow the same conceptualization process, except that logistics relies on flows that physically goes beyond all the organizational functions. Indeed, logistics consists in controlling the physical flows and thus questions all the major traditional functions inspired by the first typologies of Fayol or Ansoff. The transversal nature of logistics highlights its omniscience: if logistics is everywhere, how can it be possible to analyze its structuring, its evolution, its role? Over the years, multiplicity of methodological and theoretical approaches (functional, structural, institutionalist, etc.) have contributed to a more refined knowledge of the organizational configurations of logistics. The literature shows that the institutionalization of functions contributes to improve visibility in the organization, responsibility of process management, coordination of actors, and thus responds to the need for legitimacy (De Rozario and Pesqueux 2018, p.219) but also contributes to the exercise of a strategic role.

1.2. Logistics considerations within hospitals

What about logistics in healthcare and hospital sector? Several scholars embrace a systemic approach to describe and analyze logistics within hospitals. For instance, Chow & Heaver (1997) make a distinction between three main activities linked to logistics: procurement, production and distribution. Beaulieu & Landry (2002) define it as a set of design, planning and execution activities to enable purchase, inventory management and procurement of goods and services supporting provision of medical services to patients. Sampieri (2000) analyzes logistics practices through traditional physical flows and patients flows (service logistics). Despite numerous studies on logistics activities, practices or flows, very few research deals with the logistics function as a central object of research (Volland & al. 2017, Rakovska & Stratieva 2018). The first research at the end of the 1990s shows a fragmentation of the function also

limited to an optimizing vision. More recent works highlight a weak evolution from an organizational point of view, despite the growing interest of logistics researchers and the undeniably strategic role it can play in meeting the challenges of the ongoing reform. Some are therefore advocating a move towards a SC vision.

One of the main reasons that can explain the lack of knowledge on this function is the variety of flows that are divided into different sub-organizations and studied simultaneously by different academic fields. Indeed, physical flows comprise all goods: pharmaceuticals, medical consumables, sterile items, etc., which are managed by internal officine, and non-medical goods directly linked to the patient care such as food or laundry and indirectly linked (hygiene products), which are managed by other-administrative sub-directions. Beside traditional physical flows, patient flows need also to be managed in a transversal way. However, these two types of flows concern two different fields of research: the first emphasizes the optimization of operational/tactical logistics or supply chain activities, focuses on inventory management, procurement, storage or purchasing, and is embodied in Operations Management or SCM. The second emphasizes the patient, his participation, his satisfaction within a care chain in the currents of Service Operations Management, SCM Service or Healthcare Supply Chain (Abdulsalam et al. 2015). These separate focus and contributions explain, in part, the difficulties to adopt a real transversal view, but also to analyze the place and scope of logistics in the organization.

1.3. The organizational chart to reveal the logistics function within hospitals

The aim of this communication is to identify the place of logistics in organizations, its relations with other functions, the formal line of authority and its scope of activities. In order to answer the research question, we mobilize a specific and singular methodology through probably the most famous organizational tool, but ironically the least used by academics: the organizational chart.

Indeed, in his research on German university administrations Borggräfe (2016) shows that organizational charts are rarely mobilized, except in a complementary way to improve the knowledge of the context. The chart has been created by Fayol who advocated a clear definition of responsibilities *via* a schematic representation called «organizational table». Despite the usefulness of this old tool, it was widely criticized, like all the classical theories (and tools associated) from which it is originated, because it describes only the formal organization without taking into account the organizational slack with the informal organization. However,

we consider that the charts can highlight the formal lines of authority in an organization and show, for example, its functional differentiation. Moreover, even if the criticisms are well founded, charts can also be viewed as a part of organizational identity and bring knowledge on organizational structuring.

Of course, we don't deny its limitations and don't consider it as a whole that resumes the functioning of an organization, but rather as revealing new perspective of the logistics function, of the scope of activities, but also of an institutional work in progress, both through the semantic used and hierarchical or functional links. This academic approach is connected with neo-institutional perspectives (DiMaggio et Powell, 1983).

2. METHODOLOGY

In a first part, we present the selection of the sample and more quickly the data collection process (2.1). Then we explain the different steps of the qualitative data protocol (2.2) and processing (2.3).

2.1. Data collection process

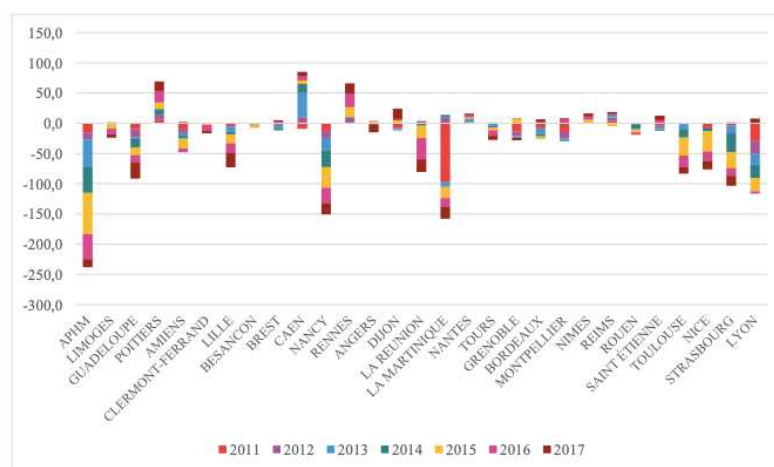
2.1.1. Selection of the sample

Today, France has more than 3,000 healthcare institutions, including 1,376 public hospitals, 1,003 private clinics and 686 private non-profit institutions (DGOS, 2018). With more than 70,603 beds and 5.6 million stays and sessions, the 32 University Hospital Centers (CHU) account for 37.9% of public hospital stays (Cour des comptes, 2018). In 2017, they recorded 5 million emergency trips, 6.3 million short stay hospital admissions and 18 million consultations². They employ 400,000 full-time equivalent staff, including 100,000 doctors and 32.6% of hospital directors according to the CNG (national management center in charge of hospital directors' transfers), for 31.48 billion euros all budgets combined. Even though there are only 32, they constitute a large and representative sample of the overall healthcare offer in France. Indeed, the CHU are centers of expertise that offer a complete range of care including medicine, surgery, obstetrics, post-acute and psychiatric care sector, as well as emergency, expertise and recourse activities. The top five French university hospitals in terms of volume

² <https://www.reseau-chu.org/article/les-chu-donnees-reperes-2017/>

of activity (APHP, HCL, APHM, Bordeaux University Hospital and Toulouse University Hospital) alone account for more than 42.6% of total hospital activity (or 43.6% excluding sessions) and the top ten hospitals for nearly 58% (including Lille, Strasbourg, Nantes, Rouen and Tours). The five UHCs with the lowest activity total 8% of total UHC activity in 2017 (7.6% excluding sessions). Excluding the APHP, an average university hospital provides around 108,000 stays per year (excluding sessions), but the standard deviation around this average is over 50,000 stays, reflecting the great heterogeneity of establishments within the group of university hospitals (Cour des comptes, 2018). In addition, CHU also have a threefold mission by integrating training and research in addition to the care provision. They are therefore logically fully representative in terms of strategies for alignment with external (especially institutional) regulations and demands to increase their legitimacy, as Tolbert & Zucker (1983) studied.

However, not all university hospitals are in the same situation and some institutions manage to generate a surplus and self-financing capacity (Cour des comptes, 2018). In 2016, despite a smaller overall deficit, 13 university hospitals had a surplus of €70 million, while the other 17 had an overall deficit of €277 million. In 2016, only four CHUs had an accounting deficit in excess of 3% of their total assets: La Réunion (5,2 %), La Guadeloupe (3,7%), Nancy (3,1%) and Marseille (3.1%). On the other hand, only the Rennes University Hospital had a surplus, the value of which (€14.7 million) was greater than 3% of its revenue (3.1%).



Source : DGOS (2011-2016) et ATIH (2017), calculs cour des comptes

Table 1: CHU accounting income (excluding APHP) between 2011 and 2017 (in M€)
Cour des comptes, 2018

The size of the hospitals is also variable: from 656 to 20.098 beds and rooms, from 3314 to 100.000 employees.

Given their financial weight, the different reforms have particularly affected the purchasing and logistics functions and activities. The deficit-reduction objective³ has effectively placed these functions at the heart of reflections and induced organizational (for example, pooling with centralized warehousing sustained by more reactive distribution systems) and technological innovations in order to improve productivity (digitalization, automation and so on...). The size and, often, the numbers of managed plants per CHU, making flows management more complex, provide also conditions conducive to these reflections and, consequently, these innovations. Thus, much research about logistics at hospital has been conducted in collaboration with logistics staff of the University Hospital Centers. For these reasons, it is today interesting to have a look at the impacts of these organizational and technological innovations on the place, scope and underlying recognition of the logistics function.

2.1.2. Organizational charts collection

The first step of data collection was to create the database of the 32 French University Hospital Centers in order to identify the functional managers in charge of logistics activities before requesting to them organizational charts by e-mail. This data collection, which took place over a 3-months period, has involved many reminders.

At least, 30 organizational charts were collected with two different levels of detail. 18 hospitals have provided the staff organization of the Board of Directors and the organizational chart of the logistics function. For the next twelve hospitals, the data collection has been first supplemented by internet research, but only the staff organization of the Board of Directors has been found (see hospitals sample in appendix).

2.2. Qualitative data coding protocol

The objective of this paper is to describe the place and the scope of the logistics function and to question its dynamics. Thus, a data base including firstly general information about the size and the financial situation of the different University Hospital Centers (number of beds, number of full-time equivalent employees, deficit situation and deficit amount) was established. Although organizational charts are necessarily influenced by reforms (pole structure for example), the financial situation can also impact the organizational structuring in order to

³ which has been divided per two in 2018 and is estimated at €102 million for CHU

legitimize rationalization actions or to create momentum for real change in prior domains like logistics, and, more extensively, flows management.

Then, the hospital centers were catalogued in a way to describe the position and the scope of the logistics function. The following table presents the retained items (Table 2).

The word “logistics” appears in the organizational chart	Yes – 1 / No - 0
What is the hierarchy level of the first apparition of the word “logistics” in the organizational chart?	Board of Directors is level 0
What is the complete function title at this first level of apparition?	
What is the complete title of its reporting line?	
What are the complete titles of the different functions at the same hierarchy level?	
What are the titles of the different activities / services supervised?	

Table 2: Items retained

The main objective of these different questions is to allow analysis about:

- The presence or not of the term “logistics” in the organizational chart,
- The hierarchy level to which the logistics is firstly related. The underlining recognition of the logistics function is here questioned,
- The complete title of the function including the word “logistics” at the first level of apparition. The objective is here to have a look at the consolidation of functions or not, for example “Logistics and purchasing”,
- The complete title of the reporting line allows us to identify the pole, department or direction in which the logistics function is positioned and, with the next interrogation, to know with which other functions the logistician is “integrated” and potentially coordinated. Although the central topic of this paper concerns “logistics”, these items could inform about the management of transverse lens flows,
- The last item refers to the function scope. It gives also an idea about the underlining recognition of the logistics function especially when it is consolidated with others like purchasing for example. The activities repartition between different “branches” (purchasing, biomedical, logistics, and so on...) allows to appreciate the strategic, tactical or operational status of the logistics function, as well as its capacity to manage transversely the different flows under its responsibility. The nature of flows concerned (pharmaceutical, medical and non-medical, biomedical, patients, hospitality including catering, laundry and so on..., general maintenance) gives also information about the choices made by hospitals concerning the prerogatives in flows management between

medical and administrative staff. It informs also about the consideration of interactions between goods (medical, non-medical, catering and so on...) and patients flows.

The database was fulfilled firstly by two researchers and then a third one has compared the results of their respective data coding. In case of differences, a third data coding was realized allowing to choose between the two first transcriptions. This comparison has enabled to achieve reliable transcription of data.

The terms used by the different hospital centers (function, activities and services titles) show to be extremely heterogeneous. These terminological differences required a harmonization step of employed vocabulary before the data treatment. Two researchers, in line with terms and expressions usually employed in Anglo-Saxon papers, have jointly achieved this step.

2.3. Qualitative data process

The qualitative data processing consists in two steps. First, a word count and a visual analysis based on word clouds were conducted. Then a classification step was realized in order to develop the typology of the logistics function.

2.3.1. Word count and visual analysis

Word clouds are graphical representations of word frequency that give greater prominence to words that appear more frequently in a source. They are increasing of these “tools” in many different fields, especially at the first step of data analysis. For example, in their work on strategic adoption of supply chain management, Sweeney et al. (2018) mobilizes word clouds to give a useful visualization of how respondents define the terms “logistics” and “supply chain management”.

Here, word clouds were generated for each first level of apparition of the term “logistics” in a function title. For example, in CHU 2, the term “logistics” appears the first time at level 2 in a function entitled “Procurement and logistics” and positioned in the “Material resources direction”. In CHU 3, it appears the first time at level 1 (just under the Board of Directors) in a function entitled “Investments, logistics and Safety”.

Word clouds were thus based on functions and activities / services titles. The aim was to get keywords for exploring the scope of the logistics function (main flows and activities managed), but also the main functions with which logisticians are potentially coordinated. Based on this information, the second step of data processing consists in developing a typology of logistics

function. In order to achieve this objective, a classification of activities was realized. The word clouds facilitate this classification. As written by Treiblmaier & Mair (2016) in their exploration of applications of text analysis in supply chain management, they “*provide an ideal starting point for further discussions. For instance, the relative size of the words (topics) can be used to critically assess the importance of the respective topic within the organization. Additionally, it is possible to discover ‘missing’ topics*” (p.3).

2.3.2. Classification of the logistics function

The classification’s objective is to make sense based on raw, disordered empirical data by categorizing them (Grawitz, 1996). Two steps are thus important: the choice of the analysis unit and the definition of the strategy categorization. In view of the empirical data and in line with the descriptive objectives of this research, words and expressions designating activities, services or functions are the basic units of analysis. The categorization consists here in grouping of close words and expressions, or words and expressions referring to the same aspect of the phenomenon around key topics. Thus, the reviewing of the word clouds permits to create / select preliminary categories. The objective of this type of categorization is only descriptive as developed by Strauss & Corbin (1990 p.61-69) who speak about “open coding” or Huberman & Miles (1991, p 97) who classify it as “descriptive”.

Researchers generally oppose two “ideal-types” of categorization strategies: *a priori* method developed by Huberman & Miles (1991) and *a posteriori* method from the grounded theory (Glaser & Strauss, 1967). Instead of setting one method against the other, Lincoln & Guba (1985, p.333-336) proposed a continuum based on several dimensions in line with the research strategy.

The mobilized method is a mix-method between *a priori* and *a posteriori* data treatment. The literature on hospital logistics, and logistics management in general, allows *a priori* categories construction potentially based on flows types (patients, medical, non-medical and so on...), decision levels (strategic, tactic or operational) or, in line with the logistics chain constitution, on its three main sub-systems (procurement, production and distribution). During this classification, the *a priori* categories evolved in order to be more pertinent with the collected data and the hospital structure observed. This protocol has been tested by two researchers in order to insure the coding reliability, especially its reproducibility. Each hospital was finally categorized in the view of the characteristics of its logistics function.

3. RESULTS

As mentioned above, we managed to collect 30 general organizational charts and 19 detailed organizational charts, on 32 CHU. In a first part (3.1), we present the results concerning the place of the function (first apparition in the organizational chart and reporting line). We focus then (3.2) on its characteristics depending on the first level of apparition (function title, other functions at the same hierarchy level and scope of activities). The last part (3.3) synthetizes results.

3.1. Place of the logistics function in University hospital centers

Before presenting the results on the logistics function's apparition, it is already interesting to comment organizational chart's shape.

3.1.1. General comments on organizational charts

First of all, the shapes of organizational charts are very diverse, some traditional in form of tree, others more singular in form of circle for example! The organizational charts translate a willingness to assert organizational identity (Borggräfe, 2016) and to represent organizational complexity.

Moreover, 19 hospitals out of 30 show administrative and medical poles on the same organizational chart, but without inserting any visible link between them. No form of matrix organization appears in the chart's sample while it could connect medical and administrative staffs.

3.1.2. Logistics apparition in organizational charts

The first result is that "logistics" appears in all organizational charts. The level of first apparition varies, however, between University Hospital Centers (see table 3).

Hierarchy level of the first apparition of the word "logistics" in the organizational chart	Number of University Hospital Centers
1 (Attached to the Board of Directors)	47% (14)
2 (Largely attached to the "Material Resources Direction")	47% (14)
3	6% (2)

Table 3: First level of apparition of the logistics function

Reporting line titles are relatively homogeneous in the sample. The term “logistics” appears the first time at different levels in the organizational charts. The function in which “logistics” appears the first time is directly attached to the Board of Directors in 47% of the cases. It appears in 47% of the cases at the second level. At this level, the function is attached to the “Material Resources Direction” in 71,43 % of the cases. Only two hospitals have placed “logistics” the first time at level 3. At this level, the function title doesn’t aggregate “logistics” with others activities and these functions (“logistics” and “Logistics sectors”) are attached for the first one to the “Material Resources Direction” and for the second one to “Equipment, Hotel politics and Purchasing Direction”.

3.2. Function’s characteristics

In order to identify the logistics function characteristics at each first apparition level in the organizational chart, the sample has been split.

3.2.1. Functions directly attached to the Board of Directors

Function Title

As is shown by the following “word cloud” and table (**Figure 1**), on the 14 cases concerned by this analysis, “logistics” is more often linked to “Purchasing” (50% of the cases) and “Investments” (35,7% of the cases). These two items could also appear together in the same function title. The total of word apparition percentages exceeds therefore 100 %.



Figure 1: Function title (directly attached to the Board of Directors)

Functions at the same hierarchy level

In order to appreciate the recognition of the function, observing other functions at the same hierarchy level is interesting (Figure 2). When “logistics” appears at the first level in the organizational chart, the main functions at the same hierarchy level are Human resource management (92,85% of the cases), Finance management (92,85% of the cases), Research (78,57%), Quality (71,42%), Information system (57,14%) and Healthcare coordination (57,14%). The full list of words is available in Appendix.



Figure 2: Function title at the same hierarchy level (directly attached to the Board of Directors)

Scope of activities

As is shown by the following “word cloud” (Figure 3), the scope of activities of these functions includes “Purchasing” in 78,57 % of the cases, “Catering” in 64,28 % of the cases, “Procurement”, “Laundry” and “Works” in 57,14 % of the cases.



Figure 3: Function scope of activities (Level 1)

It is interesting to note that these functions generally cover the scope of “Purchasing, Procurement and Logistics”. Operational logistics covers generally freight transport (medical and non-medical), patient transport, to a lesser extent, including stretcher, logistics platform and distribution. It covers also activities like laundry, reprography, garage or mail services.

3.2.2. Functions non-attached to the Board of Directors

Function title (Level 2)

At this level, “Logistics” appears three times alone in the function title (3 on 14 which represents 21,4 %). For the others function titles, as is shown by the following “word cloud” and table, “logistics” is always more often associated with “Purchasing” (in 35,7% of the cases), “Hotel services” (28,6% of the cases) and “Procurement” (21,4% of the cases). These three items could also appear together in the function title. The total of word apparition percentages exceeds 100 %.



Figure 4: Function title (Level 2)

Reporting line and functions at the same hierarchy level (Level 2)

As mentioned earlier, at this level, functions are largely attached to a “Material Resources Direction” (Table 4). However, the function titles are homogeneous centered on “Purchasing”, “Procurement”, “Hotel affairs” and “Logistics” (Figure 5).

Reporting line	Nombre	Function title
Material Resources Material Resources and Engineering Physical Operational Resources	11/14	Procurement and logistics ; Transversal logistics ; Logistics Production and logistics Hotel affairs and logistics ; Hotel equipment and logistics Purchasing and logistics (2 hospitals) Purchasing, procurement and logistics services Purchasing, hotel policy and logistics Purchasing, hotel, logistics, and biomedical engineering
Support Function and Investment	1/14	Procurement and logistics
Investment	1/14	Logistics function
Support function	1/14	Economic affairs and logistics

Table 4: Reporting line title and function title (Level 2)

When “logistics” appears at the second level in the organizational chart, the main functions at the same hierarchy level are “Estate management” (in 57,14% of the cases) and “Purchasing” (57,14%). Then appear “Technical services” in 50% of the cases and “Biotechnical engineering”, “Works” and “Information system” (35, 7%).



Figure 5: Functions at the same level in the organizational charts (level 2)

Function scope of activities (Level 2)

As is shown by the “world cloud” (Figure 6), the main activities managed by the function at this level are “logistics platform”, “patients transport”, “laundry” and “catering”, “freight transport” and “procurement”, “reprography”, “mail services” and “purchasing”. These results however shall be interpreted cautiously because only 8 out of 14 charts are detailing the scope of activities.

	(92,85% of the cases), Research (78,57%), Quality (71,42%), Information system (57,14%) and Healthcare coordination (57,14%)	(50% of the cases) and “Biotechnical engineering” , “Works” and “Information system” (35, 7%)	<u>hospitals</u>), “Management Control”, “Quality”, “Health Safety”, “Technical Resources and Property Asset”, “Sustainable development”, “Biomedical” (<u>in the 2 hospitals</u>), “Safety, Security and prevention”, “Catering”, “Paper and numerical flows”
4	The scope of main activities includes “Purchasing” , “Catering” , “Procurement” , “Laundry” and “Works” , “Maintenance”	The scope of main activities includes “Logistics platform” , “Patients transport” , “Laundry” and “Catering” , “Freight transport” and “Procurement” , “Reprography” , “Mail services” and “Purchasing”	The scope of main activities is <u>available for one of the two hospitals</u> . It covers “Catering”, “Laundry”, “Housekeeping”, “Platform”, “Procurement”, “Mail services”, “Vehicle Pool”, “Green spaces” and “Transport”

Table 5: Results synthesis (function titles, reporting line, functions at the same hierarchy level and scope of activities)

4. DISCUSSION

In a first part (4.1), we compare the results with the theoretical classifications identified in the literature review. The second part (4.2) analyzes the underlying rationales of the structuring of the hospital logistics function. The last part (4.3) is devoted to the presentation of a “logistics functions matrix” based on the organizational position and scope of the function.

4.1. Back to the hospital logistics literature

In early research on hospital logistics in France (Sampieri, 2000, Beaulieu & Landry, 2002 or Aptel & Pourjalali, 2001), “*economic services*” was the most widely terminology used, although the “function titles” could vary from one establishment to another. The organizational charts studied show a real evolution of the terminology used: the word “logistics” is systematically present in organizational charts, whereas it was absent from early research in the late 1990s (Aptel, 1999).

As mentioned in part 1.2., several typologies identified the scope of logistics in hospitals. Let us go back to these typologies and compare them to our empirical database.

Chow & Heaver (1997) identify procurement, production and distribution. Research work of Beaulieu & Landry (2002) highlights purchase, inventory management and procurement of goods and services supporting provision of medical services to patients. The results confirm the link between logistics and *purchasing* and/or *procurement*. Besides, the terms *inventory* and *distribution* are not present in charts; however, we can find *platform* (or *storage location*) and *transport*, which can be associated to these words. Moreover, no *production* is mentioned but *laundry* and *catering* could be associated to production activities.

Some significant activities, absent from theoretical typologies, are revealed by the empirical database. A first “family” of words comprises *works*, *estate management* or *investment*, while a second one concerns *biomedical engineering and/or equipment*.

Another typology (Sampieri, 2000) distinguishes physical and patients flows. It is interesting to note that patients are few expressly mentioned at level 1 in the organizational charts, notably in the scope of the logistics function’s activities (just “patients transport” and “stretcher” appear, but only in 3 out of 14 cases). However, a « Healthcare coordination » function is directly attached to the Board of Directors in 57,14% of the cases. Does this mean that the patient’s circulation is the responsibility of medical poles or that some activities titles does not expressly show patients flows (like “transport” for example) although they include them?

Moreover, there is also a theoretical distinction based on competencies: on one side, administrative staff manage non-medical flows while, on the other side, medical flows are the responsibility of medical staff. This distinction is by the way a source of fragmentation in flows management. The results confirm this fragmentation in diverse domains notably in pharmaceutical one. The word *pharmaceutical* is very few mentioned (3 times only) in the scope of activities. When it appears, it is rather linked to *purchasing* than *logistics* or *procurement*. The maturity level of hospital pharmacies, notably in University hospital centers, could probably explain these results. The latter have integrated all activities of flows management process (purchasing, procurement, inventory management, warehousing, distribution, traceability, legacy control...), as they have been aware of logistics process and of a supply chain approach.

Concerning the scope of activities, it is relatively homogeneous at all levels of the organizational chart. These activities could be grouped in 4 main families: purchasing, procurement, hotel services (including catering and laundry) and estate management (including works and maintenance).

4.2. The processes underlying the grouping of the logistics function

In order to identify the rationales behind the structure of the logistics function as described above, we below discuss their reporting line, their potential coordination with functions at the same level and their scope of activities.

When logistics function, regardless of their title, is attached to the Board of Directors, it coordinates naturally with traditional general management functions like finance, human resources and information systems and with functions specific to the hospital field like research, quality and healthcare coordination. This therefore reflects a strategic recognition of the logistics function. However, two main function titles (“purchasing & logistics” and “investment & logistics”) seem to evoke two dominant underlying rationales. The first seems indicative of a deliberate intention to optimize the “Purchasing – Procurement” couple. The second seems rather to reflect the consideration of logistics issues in renovation / infrastructure maintenance or construction operations and investment, notably in biomedical equipment and maintenance. At the level 2, nearly 79% of the functions where the term logistics appears are attached to a Material Resources Direction, which reflects a less strategic vision and express support activities. For the 21% of the functions that are attached to the support and/or investment functions, their scope of activities indicates that the same perspective is prevalent.

Four type of functions stand out: “logistics” or “logistics & procurement”, “purchasing & logistics”, “hotel services & logistics”. Functions at the same hierarchical level, as well as their scope of activities, are rather set in a tactical and operational perspective (see 3.3 – results synthesis).

At the level 3, only two establishments appear with strictly logistical titles. Based on the analysis of their hierarchical attachment (“Material resources” and “Equipment, hotel policy and logistics”), the functions at the same hierarchical level and their scope of activities (see also 3.3), these functions seem to correspond to those of at level 2 having the same strictly logistical title and operational content.

To synthetize, the analysis of the processes underlying the grouping of the logistics function reveals a distribution of activities through strategic, tactic and operational levels.

4.3. Proposal of a typical function matrix based on the logistics function place and scope

The following matrix (**Figure 7**) reflects also the main rationales behind the logistics function. By which we mean the implication of logistics in strategic, tactical or operational decisions and type of decision (investment or managerial).

At the strategic level, in an “investment” perspective, logistics is involved in new construction or renovation projects in two ways. In a classical way, physical and patients’ flows are taken into account from the building design phase (logistics network conception with storage locations, transport technologies and so on...). The second way refers to “temporary logistics” during the construction phase in order to insure engineering, equipment procurement and project management, notably for logistics and biomedical equipment. Then, the maintenance of buildings and equipment refers to a more tactical, indeed operational, perspective. Always at the strategic level but in a “managerial perspective”, the optimization of the “purchasing – procurement” couple refers to a more transversal management of flows in order to reduce cost and improve service quality for the medical poles.

Even if at the tactical level, the same activities clusters could be found (such as “purchasing & logistics” and “procurement & logistics”), the question of these couples’ optimization is still raises. Organizational charts, notably reporting line and scope of activities, rather show that activities managed are operational and that the orientation concerns cost control and reduction by a material resources direction.

This orientation characterizes operational functions (level 2 or 3) but also the scope of activities managed, which is clearly operational in itself.

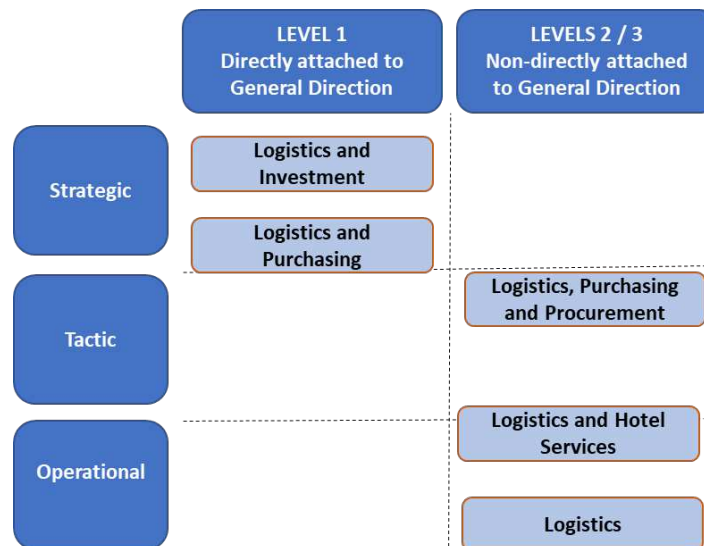


Figure 7: Profile of hospital logistics functions

In the next phase of these research program, this matrix will be “tested” and enriched through case studies. The aim will be to identify the level of intervention of logistics, in particular to analyze who which manager takes on the strategic role of logistics and with which other functions coordination takes place. Through in-depth research, including the history of the organizations studied, we will seek to understand the dynamics of the function evolution: both the potential trajectories, but also their momentum.

CONCLUSION

The objective of this communication was to study the way the logistics function is structured within hospitals. Our research, based on the organizational charts of French university hospitals centers, highlights a variety of configurations. The first results show that logistics is now present in all organizational charts. However, in the light of this results, its real consideration, and accordingly the role (strategic, tactical or operational) the logistics could play within hospitals deserves to be still questioned. The conceptual matrix, based on the place of the logistics function (first level of apparition, reporting line) and decision level (functions at the same hierarchical level and scope of activities) shows differences and questions the function evolution.

The paper includes methodological contributions through an original empirical tool: the organizational charts. Analyzing such heterogeneous objects needed to build a specific method, to structure the data, to code and to show significant results through word clouds. Because it

reflects only the static dimension of the organization while neglecting its interpersonal and informal dimensions, organizational chart is heavily criticized and accordingly under-mobilized. However, it shows a form of dynamics in hospitals. It can be mobilized to identify coordination needs and to explore how to ensure this coordination, not through the mechanisms identified by Mintzberg (1982), but rather through human interfaces. The mapping of the logistics function (place and scope) in University Hospital Centers provides information about transverse flows management in view of its integration with other functions (purchasing for example) in larger poles, departments or directions. It also let subtly guess some dynamics, as they are moving objects. For example, different charts showed vacant new jobs. These weak signals demonstrate the interest of mobilizing more frequently the organizational charts, notably in longitudinal perspectives.

However, this research has some limitations. First, the empirical database is limited to French university hospitals and to public context. It could be interesting to replicate this study with a larger sample including private and public actors in France and in other developed countries, in order to compare their structure and enrich the comprehension of their respective structuration. Moreover, some detailed charts were missing; in particular, for those the word logistics was non-attached to Board of Directors. The matrix is only conceptual and must be challenged, tested and enhanced by a qualitative case study.

Therefore, the research demonstrates the need to deeply understand the dynamics of organizations, through a historical study of organizational charts, beside financial situation, internal context and institutional changes. Through success and failed, the momentums and obstacles could be identified, both inside and outside organizations, in order to explain the evolution of the structures and to accompany, advise and support hospitals in this change.

Last but not least, the managerial findings contribute to question the role logistics can play but also its potential place and scope in hospitals and its contribution to performance. For example, a most recent study on purchasing performance (Grelier, 2019) highlights that the suppliers' selection doesn't take into account logistical factors such as supply quality, deadlines respect or emergency procedures. The exclusion of logistics measures in purchasing criteria can then affect negatively the global performance. Moreover, the COVID-19 crisis shows that logistics can play a strategic role in case of outbreak. By consequence, the structuring and the legitimation of the logistics function cannot be separated from the question of the best-positioned manager to take logistics issues, and more broadly, flows management at a strategic level. As in industry, without changing radically the existing structures, transversal teams, with powerful system of key indicators to track the supply chain's performance, may be relevant to

better coordinate medical poles needs, supply management and purchasing. In this vein, it will be therefore interesting to study job profiles, scope of activities and competences of the operations managers, recently appeared in some hospitals.

Appendix

	Higher hierarchy level of apparition	Full function title at the first level of apparition	Title of the reporting line function (n+1)
CHU 3	2	Investments, logistics and safety	Board of directors
CHU 7	2	Purchasing and logistics	Board of directors
CHU 9	2	Purchasing, equipment and logistics	Board of directors
CHU 10	2	Estate policy, medical technology and logistics	Board of directors
CHU 15	2	Investments and logistics	Board of directors
CHU 17	2	Investments, logistics and new hospital	Board of directors
CHU 20	2	Purchasing and logistics services	Board of directors
CHU 20bis	2	Purchasing and logistics services	Board of directors
CHU 23	2	Purchasing, logistics and medical technology activities	Board of directors
CHU 24	2	Investments and logistics	Board of directors
CHU 27	2	Purchasing, logistics, amenities, safety, environment	Board of directors
CHU 28	2	Investments, logistics and purchasing	Board of directors
CHU 30	2	Hotel, logistics and healthiness	Board of directors
CHU 31	2	Logistics	Board of directors
CHU 2	3	Procurement and logistics	Material resources
CHU 4	3	Transversal logistics	Material resources
CHU 12	3	Production and logistics	Material resources
CHU 18	3	Hotel affairs and logistics	Material resources
CHU 19	3	Purchasing, hotel policy and logistics	Material resources
CHU 22	3	Logistics	Material resources
CHU 25	3	Purchasing and logistics	Material resources
CHU 29	3	Hotel equipment and logistics	Material resources
CHU 26	3	Purchasing, hotel, logistics and biomedical engineering	Material resources and engineering
CHU 13	3	Purchasing, procurement and logistics services	Operational physical resources
CHU 1	3	Procurement and logistics	Support functions and investments
CHU 5	3	Logistics functions	Investments
CHU 8	3	Economic affairs and logistics	Support functions
CHU 32	3	Purchasing and logistics	Loiret GHT Pole
CHU 6	4	Logistics	Material Resources
CHU 11	4	Logistics sectors	Equipment, hotel and purchasing policy

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