

# The Effect of Information Exchange on Inter-Functional Coordination within Hospital Supply Chain: Case of Moroccan University Hospital

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## Abstract

This research aims to explore the causal relationship between the information exchanged and inter-functional coordination (IFC) in the Hospital Supply Chain (HSC) context "Case of Moroccan University Hospital (MUH)". Specifically, the research aims to identify the dimensions of information exchanged the most significant and that influencing between services directly involved in the pharmaceutical and information flows associated within the MUH. To achieve this goal, we conducted 20 semi-structured interviews with all the key players in this HSC: administrators, doctors, pharmacists, nurses and supervisors.

Keywords: IFC, exchange information, supply chain, hospital system,

## Introduction

The healthcare environment characterized by growth in health care spending, an aging population, an integration of technologies more sophisticated and more expensive... (Di Martinelly, 2005) the hospital needs to restructure and rebuild their approaches to management and organization to better meet the needs of patients. He must try to *"adapt to the internal while paying greater attention to innovation by introducing new approaches to reducing the growing fragmentation affecting health services"* (Boelen, 2000) cited by (Kosremelli, 2006). So conceptualize the hospital as a Hospital Supply Chain (HSC) appears as an innovative approach to reduce this fragmentation. In this sense, Andre & Fenis (2007) defined the hospital as a HSC that has its own internal chain and that must be able to integrate into the outer chain (Rivard-Royer et al. 2002).

The HSC can be defined as *"a set of intra-hospital entities (administration, logistics services, medical units and medico-technical units) and inter-hospital (suppliers, laboratories, wholesalers, patients) directly involved in the physical flow, informational and financial since the*

*first suppliers to patients and willing to coordinate for a common goal : patient satisfaction". At the heart of this definition, it is clear that the success of the HSC depends on the coordination of internal services of the hospital. It is the Inter-Functional Coordination (IFC). The latter, it becomes more than a demand, it becomes a requirement of practice to "counter the organizational rigidity intrinsic of most health organizations" (Franchistéguy, 2001, p. 19).*

The IFC brought interest from several disciplines (social science, marketing, SC, Human resources management...) and several sectors (industrial, hospital ...). Meanwhile, the problems related to the IFC are multiple (its determination, its factors or antecedents, its implementation...). Thus, while addressing the issue of the IFC factors in the context of the HSC, our research is limited to the exchange information factor.

Researchers agree that the information between SC actors exchange is a key factor in its success (Graw et al. 2008; Fabbe-Coste, 2000; Fawcett & Magnan, 2001; Ramayah & Omar, 2010). But the question of the impact of different dimensions of information exchanged is insufficiently covered in the literature. This is the amount and quality aspect of the information. They are important attributes in information sharing (Ramayah & Omar, 2010).

In the Moroccan context, the health sector is in transition. It has in recent years experienced a growth of health spending, slowing population growth, aging of the population... (Berraho & al. 2006). In such a context, the Moroccan Ministry of Health is part of a logical of transformation of its systems of care, of its organizational structures and of its approaches to management (Zerouali & Bendou, 2012). Indeed, it is involved in several actions: hospital reforms, action plans, projects... among the components of these actions are part of the compartmentalization and coordination of internal hospital services with a particular focus on managing information exchange as a vector for this component (Berraho et al. 2006). Our problem is thus to determine the causal relationship between the coordination and exchange of information. It is in the form of the following question: *"What are the dimensions of information exchanged, the most significant, influencing the IFC in the context of the SC of MUH ?"*

To address this problem, this paper has four parts: (I) the literature review (IFC and HSC); (II) The conceptual framework and research proposals; (III) the research methodology; (IV) Results and discussions.

## **1. Literature review**

### **1.1. The Inter-Functional Coordination**

The IFC has become a topic of current interest in recent years. Indeed, Narver and Slater (1990) consider the IFC as one necessary principles of market orientation. It is a coordination of business resources to create better value for target customers. Woodside (2005) expanded understanding of the IFC to the willingness of employees to communicate, think and work together in order to achieve the objectives of efficiency, competitive advantage and business performance. In the same vein, Zhao & Cavusgil (2006) showed that the ICF helps companies acquire their market success and their performance.

Moreover, Dwyer & Tanner (1999) marked the IFC as a partnership between the internal marketing departments, research and development, procurement, manufacturing and finance. In the same perspective, Mentzer (1993) considers the IFC as integration between engineering, purchasing, marketing, manufacturing and logistics.

Min (2001), Mentzer et al. (2001), Eng (2005), Golicic & Vitasek (2007), consider the IFC as a key element within the organizations of the SC. This coordination is justified by the need to achieve common goals of improving the long-term performance of individual companies and the SC as a whole (Min, 2001).

The review of the literature, as well, of the IFC is marked by several definitions (Narver & Slater, 1990; Hodge et al 1996. Min, 2001, Eng, 2005; Tay & Tay, 2007; Farzard et al. 2008; Zhao & Cavusgil, 2006). In addition, it is clear that the term coordination is often used interchangeably with other related term; integration, cooperation and collaboration (Moharana et al. 2012). But *"While each of the terms have separate and distinct names, they refer to a similar and overlapping idea as evidenced by the commonalities in their definitions. The lowest common denominator which integrates the four concepts is joint behavior toward some goal of common interest"* (Pinto et al. 1993, p 1286). It is on this basis that we define the IFC and we will inscribe in the definition of Min (2001). It is the *"coordinated efforts across functions to accomplish common goals, such as creating customer value and responsiveness to market changes, under close relationships among the functions"*.

## **1.2. The Hospital Supply Chain**

Over the past twenty years there is a large literature that examines the SC approach in the industrial sector, but there is a limited academic literature that addresses the challenges of health. However, in these small literatures examining the SC of hospitals, there is a general agreement that the HSC and its management is complex (Bourlakis et al.2011).

The HSC is represented as a systemic structuring of several logistics activities in a global optimization approach of the production system of care for improved patient satisfaction (Costin & Chitou, 2012). This plurality of logistics activities within the HSC reveals the presence of two chains for deliver the different products from suppliers to points of use, an external chain and an internal chain to health establishment (Rivard-Royer et al. 2002). The two chains are composed of suppliers, carriers, manufacturers, patients, hospital services (administration, logistics services, medical and medico-technical units)... (Taher, 2006; Moisdon & Tonneau, 1999; Kharraja, 2003) directly involved in physical, informational and financial flows (Andre & Fenis, 2007) and willing to coordinate for better patient satisfaction. Thus, the success of the HSC depends on the quality of its inter-functional and inter-organizational coordination.

According to its centered vision on the hospital pharmacy, Taher (2006) has a structure of the HSC by segmenting it into two levels.

Firstly, the upstream level (suppliers/pharmacy), whose role will be to provide pharmaceuticals to the pharmacy. Secondly, the downstream level: a first level downstream (1) (pharmacy/care unit), which provides products to services using parts obtained from suppliers with or without transformation. Secondly, the downstream level (2) (care unit/ patient) that correspond to the point of consumption, whose role is to ensure the supply of products to patients (inventory management) and returns management.

In the study of SC, the definition of boundaries is an indispensable phase (Picholt, 2006). We reduce, thereby, the extent of the chain seen in the internal SC. The latter includes all [services] involved in the physical and information flows from the input of [hospital] at its output (Harland, 1996; Wolf, 2008). In this chain we study the causal relationship between information

exchange and coordination (the explained variable and explanatory variable) between intra-hospital services directly involved in pharmaceutical flows and information flows associated.

## **2. Conceptual framework and research proposals**

In this part, we begin by setting out the explanatory variable (information exchange) to then justify its impact on the IFC in the HSC. We then arrive at the development of our research model.

### **2.1. Information Exchange**

Effective management is essential to ensure the coordination and integration of the SC. In this sense, information exchange, defined as the formal and informal sharing of information is a key element in the success of the SC (Graw et al. 2008). It carries a high level of integration (Jarrell, 1998) and the coordination of actors of the SC (Di Martinelly, 2008; Zouaghi et al. 2012). Fawcett & Magnan (2001) aptly sum it up by stating: 'information is the "life blood" of effective supply chain management. In addition to the coordination of activities of the SC, the exchange of information can accelerate the effective decision-making and facilitate reaching common goals (Bowersox et al. 2003; Gustin et al. 1995).

As a result, the exchange of information reflects expectations supply chain members have in willingness to exchange key technical, financial, operational and strategic information among supply chain members and across functions (Bowersox, et al, 1999). In this sense, the exchange can involve the transfer of information within a company and extend outward toward customers and suppliers (Zailani & Rajagopal, 2005). In the same vein, Martin & Grbacb (2003) note that to be ready to share information with suppliers, the company must have a culture of information sharing between its internal functions.

At inter-functional level, the exchange of information can coordinate actions and to achieve efficiency (Graw et al. 2008). In the same vein, Fabbe-Costes (1998) believes that *"the exchange of information between units that represent ability to circulate and distribute information within an organization is a feature that takes an increasingly important role in logistics since it is necessary to automatically trigger operations, for coordinate actors or follow the progress of operations [...]"* cited by Lievre (2000).

Information sharing has two aspects: quantity and quality (Li et al. 2006). These two aspects are important attributes in information sharing (Ramayah & Omar, 2010). One hand, level quantity aspect of information sharing refers to the extent to which critical and proprietary information is communicated to one's supply chain partner (Monczka et al, 1998). On the other hand, the quality aspect is a multidimensional concept (Ballou & Pazer, 1995; Madnick et al. 2009). It is refers to Accuracy, Timeliness, Accessibility... (Reix, 2004; Daft & Lengel, 1986; Wang & Strong, 1996; O'brien, 1995).

In this study, we focused on quality aspect as a manifestation of the information exchanged to explain the IFC. The quality aspect is recognized as a key element of SCM practices (Li et al. 2006) and coordination of activities within the SC (Ramayah & Omar, 2010).

Moreover, the diversity of dimensions of quality of information can cause the confusion in our research. Thus, it is preferable to choose a classification of dimensions in order to avoid the lack of clarity in our research. That is why we choose the work of O'brien (1995). This author has proposed 15 aspects of quality of information that can be classified into three major

dimensions; the temporal dimension (information must be timely, accessible, available at all times...), content (information must be accurate and reliable. It must come from reliable sources and checked. It must also be relevant, suitable, useful...) and form (the information must be clear, precise, have supports, in particular, ITC...). It is through these three dimensions that we clarify the role and impact of the exchange of information on the IFC.

These findings lead to the formulation of proposals and research design that will be explained in what follows.

**2.2. Proposals and research model**

The purpose of this paper is to explore the relationship between information sharing and IFC in the context of the Moroccan HSC. The analysis of our problem leads us to focus on a set of dimension of information exchanged: the temporal dimension, the content and form of information influencing the IFC.

To answer this question, we will offer a principal proposition (P) and three secondary propositions (P1, P2 and P3) :

P. The exchange of information has a positive effect on IFC in HSC context;

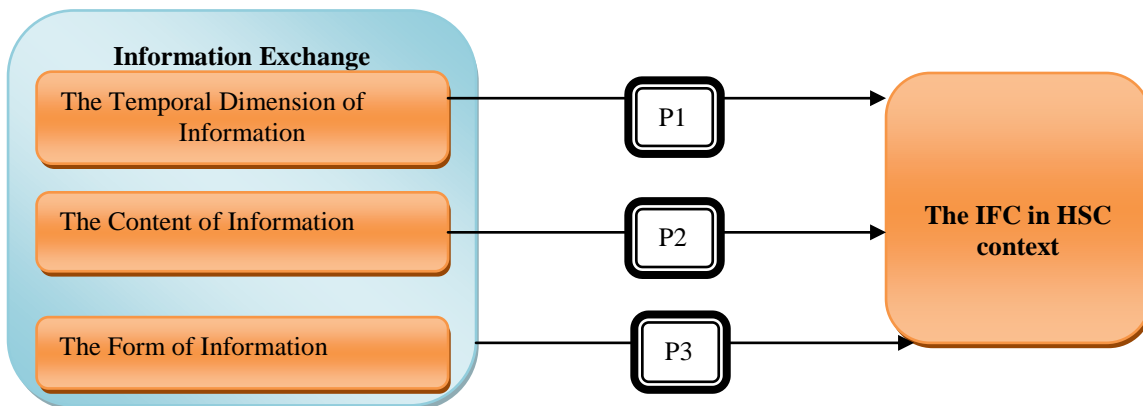
P1. The temporal dimension of information exchanged has a positive effect on IFC in HSC context;

P2. The content of information exchanged has a positive effect on the IFC in HSC context; and

P3. The form of information exchanged has a positive effect on the IFC in HSC context.

The taking into account the conceptual framework allows us to develop our research model. This model summarizes the relationship between information exchange and ICF in the context of the HSC. The following figure illustrates our research model.

**Figure1: Model Search**



*Source : Personal elaboration*

After designing our research model and our proposals, we try to confront the terrain study and referring a methodological framework.

**3. Research Methodology**

The choice of a research context allows specifying the situations studied management and delineate the space within which the study is carried (Fulconis, 2000). Thus it seems

appropriate to give a brief on the research context namely the Moroccan hospital sector before presenting the research methodology.

### **3.1. Research context**

In the aftermath of independence, Morocco has opted for a health model where the state was responsible for the production of health care and services, financing of health care, management of establishment and regulation of industry (MSM, 2005).

The primary objective of the health system is improving the health of the Moroccan population. It has been known since the 60s and 70s an improvement that has resulted in the increase in life expectancy at birth, reduced crude death rate, the reduction of a number of diseases including target diseases of vaccination (MSM, 2005), increased spending (6.2% of GDP in 2010 against 5.3% in 2006) (MSM, 2010).

However, the health system encounters several difficulties, sources deep in Malaysian healthcare professionals and dissatisfaction among the population. These difficulties related to unsatisfactory management of public hospitals, lack of political management and development of human resources, lack of a real medicament policy... (MSM, 2012).

To address these challenges, Morocco is part of logical processing systems of care, organizational structures and approaches to management. It is engaged in hospital reforms, action plans, major projects... The current concern is to make the image more competitive public of hospital sector in its offer quality care, with particular emphasis on logistics as a means of political control costs, mobilization and rationalization of resources (Zerouali & Bendou, 2012).

### **3.2. Data collection**

Our research methodology is based on an exploratory qualitative study. Therefore, two sources of information are mobilized: primary data and secondary data (Thiétart et al 2007.). The so-called secondary data (reports, journals, internal documents, etc...). The so-called primary data correspond to the information obtained during the exchange face-to-face with the interviewees (table) by the tool of a semi-structured interview guide was organized around topics related to this problem.

The empirical approach has led us to achieve 20 interviews (to the extent that we have reached the saturation).

Table 1: the interviewees of the Research

Interviewees	Services of the Interviewees
Doctor	Head of service of Medical Affairs Head of service of Pneumology Professor at the Faculty of Medicine
Doctor	Head of service of dermatology Professor at the Faculty of Medicine
Doctor	Head of service of Central Radiology Professor at the Faculty of Medicine
Doctor	Head of service of "A" Cardiology Professor at the Faculty of Medicine
Nurse	Major of service of Surgical emergency
Nurse	Major of service of "A" Medicine
Nurse	Major of service of de "B" Medicine
Nurse	Major of service of "A" cardiology
Nurse	Major of service of Central Radiology
Nurse	Major of service of "A" surgery
Nurse	Responsible of the pharmacy of service Emergency surgical
Nurse	Medical emergency
Supervisor	Head of the Unit of audit of hospital activity
Administrator	Chief procurement service of Beta hospital
Administrator	Adjunct of procurement service of Beta hospital
Administrator	Head of Pharmacy service of the direction of alpha UH
Administrator	Adjunct of Pharmacy service of the direction of alpha UH
Pharmacist	Head of Pharmacy service of Beta hospital
Pharmacist	Adjunct of Pharmacy service of Beta hospital
Pharmacist	Unit of Coordination of Pharmacies

Source: Personal elaboration

Our choice of target people often focuses on assistants and heads of departments within the hospital. These actors can be regarded as the essential source of information on the phenomenon of IFC.

To refine the proposals and verify the adaptation of concepts from the literature with the scope of our problem, the interviews were transcribed and coded for analysis following the principles of thematic content analysis.

### 3.3. Data analysis

In management science, qualitative research can be based on multiple methods of analysis and data processing. They depend on the research questions and expected results (causality, behavior, representation, description and test) (Wacheux, 1996). As part of our research, "thematic analysis" appeared to us as the most appropriate method. according to Allard-Poesi et al. (1999) "content analysis based on the assumption that the repetition of discourse analysis

*(words, phrases or similar meanings, sentences, paragraphs) reveals the interests and concerns of the authors of discourse" (p. 450).*

Analysis of content requires the establishment of a technique for encoding data (Miles, Huberman, 2003). Coding is one possible way by which the researcher transforms the empirical world, raw and messy experience, in an organized world of ideas and concepts (Allard-Poesi, 2003).

To proceed to the coding we must meet three main modalities (Gavard-Perret & Helme-Guizon, 2008). Firstly, we must establish rules for cutting of corpus (speech or text) and classify collected speech or text in units of meaning or themes. Our themes include the following topics: the organization of the internal SC UH, the perception of the IFC and the exchange of information. Next, the second modality comprises a coding scheme as presented topics or categories. Specifically, a category is a grouping of units of analysis (Allard-Poesi et al. 1999). The third modality is to encode each unit indicated. This coding was conducted using NVivo software to analyze units.

#### **4. Results and Discussion**

In a first point we analyze the SC of alpha UH focusing on the internal SC. Then we analyze the perception the IFC by the actors of the SC. Finally we analyze the exchange of information and its influence on the IFC.

##### **4.1. Search Results**

###### **4.1.1. The internal SC of alpha UH**

the SC of the alpha UH is designed on the architectural plan, according to the internal entities and stakeholders (administration, logistics services, care units and technical plateau) and external (suppliers, hospital, patients) directly involved in the upstream and downstream flows of physical goods and associated information, ranging from suppliers to patients. Our vision of HSC focuses on the hospital that refers to a series of functions. The alpha hospital has an SC internal type involved an external SC.

In what follows we present, first, the level upstream of the internal SC of UH, then, its downstream level.

###### **4.1.1.1. The upstream level (Purchasing and Logistics Division/ Hospital Pharmacy)**

###### **4.1.1.1.1. The Purchasing**

In the goal to restrict the budget and in order to achieve cost savings and optimize resources, alpha HU centralizes the purchases of hospital products at level of Purchasing and Logistics Division (PLD). Concerning the *"purchases of pharmaceuticals of different hospitals of UH alpha are centralized at the level of pharmacy service of PLD"* (administrator).

The buying process can be carried out in for stages: elaboration of nomenclature, expression of needs, needs assessment and selection of suppliers.

First all, elaboration of nomenclature is an important step. It is made by the Unit of Coordination of Pharmacies. This unit intervenes within the SC to *"standardize pharmaceutical products to facilitate the expression of needs and the purchase of these products by elaboration*



*of nomenclature"* (Pharmacist) and, as its name suggests, is responsible for *"coordination between pharmacies of the [alpha] UH, for example, it manages donations of medications between the pharmacies of hospitals, it controls all movement of pharmaceutical products (input, outputs)..."* (Pharmacist).

Then, *"[service of pharmacy of LPD] makes an important step which is the expression of needs"* (supervisor). This service collects and evaluates the needs of different hospitals alpha UH for finally proceeding the purchases all of its hospitals.

After the expression of needs, the needs assessment stage intervenes to confront the needs of the budget UH alpha. *"We cannot meet all needs because it has budgetary thresholds to be respected. We must assess the needs and putting the priorities"* (pharmacist). Needs are assessed by the Committee of medicament. This committee participates by its opinions in *"the definition of medicament policy within the hospital [beta], including needs assessment of services, development of the list of medicament, recommendations on prescribing and good use of drugs ..."* (Doctor).

Finally, the service of the pharmacy of the PLD proceeds to step the selection of suppliers. It *"essentially seeks to find on the market, the best quality / price ratio of pharmaceuticals with potential suppliers"* UH (2004). He buys its products by the public purchasing. He opted for a purchasing renewed automatically from year to year for a period of 3 consecutive years by setting for each product a minimum amount and maximum amount to purchase (MSM, 2013). However, *"there are purchases that are specific to hospitals of the alpha UH"* (pharmacist). In this sense, the beta hospital, that is our case study, has at its administration a service that handles its own purchases. These supply Service. An administrator said *"the needs of users of the beta hospital are centralized at the procurement service "*. The latter *"... collects the needs of different services [of beta hospital]"* (administrator), for finally proceeding the purchases all of its services by *"The organization of a committee of request for proposal or by purchase order"* (administrator).

In the case of the purchase of medicament by the service of pharmacy of LPD, the procurement service *"plays an intermediary role between the LPD and the hospital pharmacy [beta]"* (Pharmacist). He *"transforms the nomenclature from the LPD pharmacy to beta hospital and sends these nomenclatures to hospital services, finally, for express their needs"* (administrator). Once the supplier is selected, the hospital proceeds to procurement of hospital products.

#### **4.1.1.1.2. The Procurement**

The function of internal procurement is often provided by the service of the hospital pharmacy beta. It *"is a service which aims to ensure the procurement, preparation, control, detention, distribution and dispensing of medication and medical devices and to ensure the preservation of their quality"* (MSM, 2008). It contains several people (pharmacists, administrators, preparators, technicians) who are placed under the responsibility of a pharmacist Professor (Head of service), assisted by an assistant pharmacist.

Hospital pharmacy is responsible for managing the following pharmaceuticals: medicines, medical devices, surgical son, movies, radiology products, chemicals, laboratory glassware.

*"The pharmacy of our hospital [beta] has three areas, a reception area, a storage area and distribution area"* (pharmacist). First, the reception area *"includes tasks following the delivery of*

*the products by the supplier"* (pharmacist). In this sense, the actors in this area seek to ensure the quality of products delivered, compliance with the quantities delivered quantities ordered... (MSM, 2008). Then, the storage area *"is a place where pharmaceuticals are stored"* (pharmacist). It is necessary to ensure that its management. It must determine to maintain the inventory level, determine the minimum amounts, maximum amounts, the rotation of these products to meet the expiration dates... (MSM, 2008). Finally, the distribution area that distributes pharmaceuticals to various beta hospital services. It intervenes in the downstream level SC.

#### **4.1.1.2. The downstream level (Hospital Pharmacy / Health Care Services)**

The Actors intervenes in the HSC downstream for distribute the hospital products. The distribution function in the beta hospital is distributed to various services of the hospital products and services required as part of their activities (MSM, 2004). This distribution should be seeking to optimize the use of products by ensuring not to over-storing various products on units or having to too frequent distribution due to a sub-storage (MSM, 2004).

For pharmaceuticals, it is *"the hospital pharmacy that handles their distributions"* (pharmacist). It distributes products to two types of hospital services; units of care and medico-technical. On the one hand, the unit of care is considered the heart of the hospital. It is the main patient reception place. They include all functions related to the care of a particular patient and medical action in general. On the other hand, medico-technical include all the activities of the laboratory, imaging services, operating theaters, radiology...

The distribution area *"is the direct interface of the pharmacy with the services"* (pharmacist). It must allow easy preparation of demand of hospital services or other structure where are used the medicaments and the medical devices (MSM, 2008).

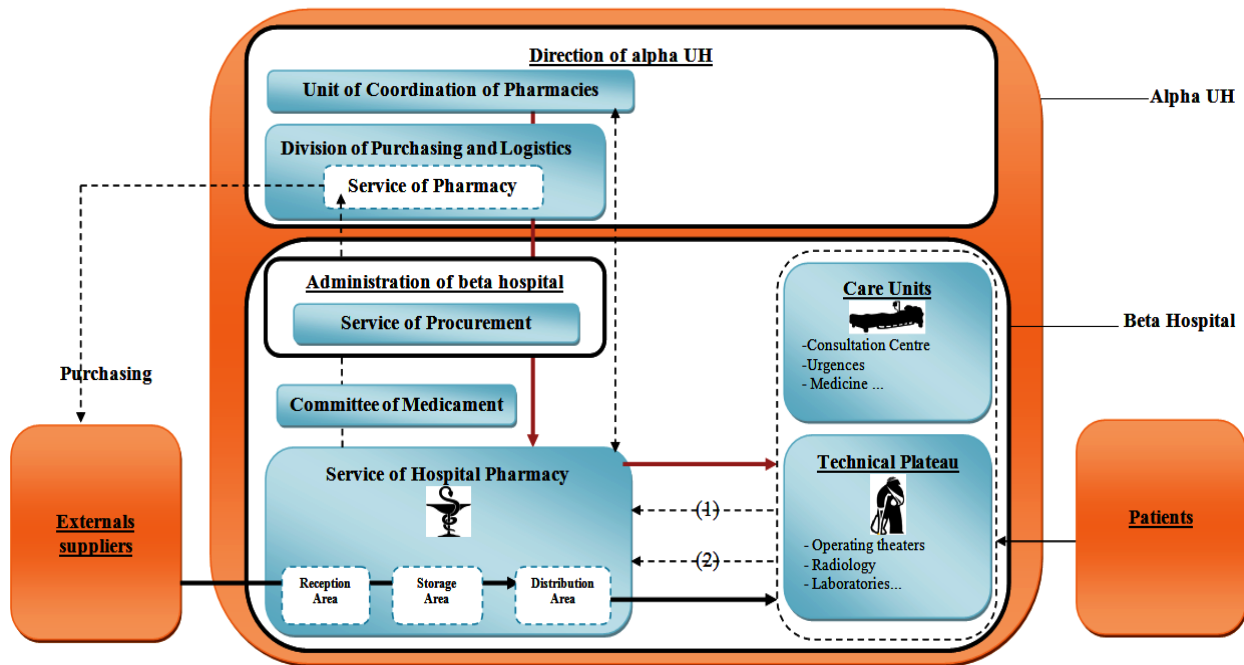
The two types of hospital services contain a set of actors (doctors, nurses, residents, technicians) under the authority of a services head doctor in the discipline or specialty concerned, assisted by a Major Nurse.

Pharmacy delivers products to care units and to medical-technical platforms by two modes of distribution. On the one hand, the overall distribution *"is to deliver services, medicament and medical devices in advance, upon an order form"* (supervisor). Delivery takes place here before prescribing. The products supplied are then *"stored at the service and issued as and when the demand of patients following a medical prescription"* (nurse). *"The orders are of two types; the weekly order and order for pharmaceutical supplement"* (pharmacist). The first allows the service to order the products needed for a period of one week. The second allows the service to order at any time the products they need and that are no longer available in their stock.

On the other hand, the nominal distribution consists *"to deliver medicaments or medical devices to a patient and not to the service"* (supervisor), which plays an intermediary role between the pharmacy and the patient. This distribution intervenes follows the prescription is for so-called expensive products.

In sum, after these interviews, we can present organizational architecture of SC of alpha UH in the figure below. We regroup all hospital actors (external and internal) involved in the flow of medicaments and information's from suppliers to patients.

**Figure 2: The SC of Alpha UH**  
**Upstream**  
**Downstream**



Source: personal elaboration

- ← - - - → : Flows of information between the Pharmacies and Unit of Coordination of Pharmacies
- : Flows of information from the Direction to Care Units and Technical Plateau (Nomenclatures)
- ← - - - : Flows of information from the downstream to upstream (needs (1) and orders (2))
- : Flows of Medicaments from the upstream to the downstream
- ← : Flows of patients

#### 4.1.2. The perception of IFC

"When there is the coordination the things will be well restrained. If coordination is absent the work will be ambiguous and you'll be lost" (administrator). "The coordination is required not only at work but also dan everyday life" (nurse).

With these two verbatim that we argue about the importance of coordination between SC actors.

The results on the perception of coordination by the actors of the HSC can be classified into three points. First, coordination is addressed by assimilation to other concepts. Then, the coordination involves several actors, it is the job together. Finally, the common goal is essential for the definition of coordination.

#### **4.1.2.1. The IFC is addressed by assimilation to other concepts**

From the responses of the interviewees, the IFC may take several definitions. We find that it is addressed by assimilation to other concepts. First, some interviewees perceive the coordination as the communication. In this sense, a nurse says *"I define the coordination through communication"* (nurse). A doctor adds, *"The coordination is the communication that takes place between several actors"* (doctor).

Then, others see it as the collaboration and the cooperation between staff. An administrator states that coordination is *"collaboration, cooperation ... between all health professionals in the hospital"* (administrators). Another nurse added coordination is a *"collaboration between several people"* (nurse).

Finally, the other interviewees defined the coordination by other words such as relationship, harmony, connection, consensus, commitment. A nurse says *"I define the Coordination by relationships between different stakeholders"* (nurse). Another administrator mentions the concept of liaison *"the coordination takes to link a set of actors in a chain."* A doctor motioned the notion of consensus *"coordination is to find a consensus among the various stakeholders"*. Another nurse defined the coordination as *"chained commitment of many parts"*.

#### **4.1.2.2. The IFC involves several actors, it is the work together**

The concept of coordination emerges as a concept that requires the involvement of a group of actors. She is addressed as the work together. Indeed, we find that the definitions of the IFC interviewed said the involvement of multiple actors. *"One hand cannot clap"* (nurse). *"When we talk about coordination must be present at least two persons"* (nurse). The definition of a administrator insists on the presence of several professional *"IFC is the work of multiple services and multiple stakeholders (administrators doctor, nurse...)"* (administrator). *"Coordination is teamwork"* (pharmacist). Coordination *"is not one person but the group we are working with"* (doctor).

#### **4.1.2.3. The common goal is essential for the definition of IFC**

In the definitions of coordination, it is found that some respondents consider that a common goal is essential for the definition of coordination. A doctor explains *"coordinate is working together with the objective of achieving quality care for the patient"*. An administrator says *"to ensure the achievement of common goals must be coordinated"*. A pharmacist adds *"coordinate means to complete in the achievement of the overall objective."* In the same vein nurse added *"coordination is a mutual work between two persons who have the same goals"* (nurse). A doctor says *"if coordination between us does not contribute to quality service, then we do nothing"*.

In sum, the concept of ICF emanates the particularities of each player in SC (administrators, pharmacists, physician and nurse) and is strongly linked to the latter. But we can see that these definitions have a common denominator that integrates *"working together with the actors in the interest of the patient"* (administrator).

### **4.1.3. Information Exchange**

All SC actors interviewed, without exception, evoke the exchange of information as an important factor influencing the IFC. It occupies an important place in all acts performed by members of the SC *"information without the work unit"* (administrator). A nurse says *"we cannot work without information"* (nurse). Another director asked *"how can we talk of coordination if the exchange of information is missing"*.

Respondents suggest that the main types of information exchanged between them may concern: needs, estimates, orders, stock status, stockouts, forecasts, nomenclature, budget, consumption statistics, inventories, vouchers, documents related to purchases, lapses of the medicaments...

Our results showed the importance of the three dimensions of information exchanged. Therefore, the importance of these differs according to the levels of the SC (upstream and downstream).

#### **4.1.3.1. The temporal dimension**

The interviewees talk about the importance of the temporal dimension of information exchange in terms of the timeliness. A nurse says a *"timeliness of information can respond in a timely manner"*.

At the upstream level we find that information sharing is done in a timely manner. An administrator justifies this by saying *"if there is new on the medication I receive it in staff meetings that are organized every week"*. A pharmacist adds *"information I receive are often timely"*.

The problem of the temporal dimension of information exchange is particularly between the Pharmacy, Medical units and Medico-technical units. A nurse explains this by saying *"I do not always receive the information in a timely manner"*. A doctor explains the reason for delay of information *"the flow of information between us is not the result of a desire to share information"*. Other words justify this by saying *"in order to obtain timely information I have to find myself"* (doctors, pharmacists, nurse). A nurse adds a *"timely information requires the research by us. If I want information on stock status I have the requested the pharmacy service and not wait for his arrival"* (nurse). Another nurse explains the phenomenon of delay *"if I complained about the delay of information, I'll have the excuse that I did not ask for information"*.

#### **4.1.3.2. The content**

The content of information exchanged is a critical variable for better coordination between the actors of the SC. Indeed, the interviewees talk about the importance of this variable, particularly in terms of accuracy. An administrator explained this idea by saying *"Information that is not accurate may contribute to poor coordination. For example, if a clinical service did not demand their needs in an accurate way, it cannot receive an amount of medicaments that exactly meets the needs of the service"*.

The degree of timeliness of information exchanged differs according the levels of internal SC of the UH. Indeed, the upstream level we find that information sharing is characterized by the appearance of accuracy. An administrator demonstrates that *"the information exchanged is usually accurate"*. A pharmacist says *"thank God! When I want information, I received with*

*accuracy. It's seldom that I check the information". While, the upstream level we find that information sharing is not characterized by this dimension. A doctor clarifies this "sometimes we get the wrong information but we corrected". Another doctor added "the error is human. It is normal to find inaccurate information". Another nurse added "an accurate information exchange to 100% is impossible because it's impossible to say exactly how many medicaments stock that exists".*

#### **4.1.3.3. The Form**

The interviewees talk about the importance of the form of information exchanged in the coordination particularly in terms of supports. A nurse explains this by saying, *"to improve coordination between all involved in the SC he must at least the existence of computer tools".*

Supports of the exchange of information are the most important aspect we found in the research. A doctor explains *"what really interests me in the exchange of information is to have ITC".* A nurse says *"ITC are very important in the exchange of information for the transfer of information without lying".* To exchange information, actors use in general, *"[...] the phone, the computer, the Internet, the groupware [the Intranet], the application of pharmacy management"* (pharmacist). However, the hospital is marked by the absence of an integrated information system as stated by an administrator *"our information system is not integrated [...] an integrated information system will allow for have a single database what will improve coordination between all departments of the hospital [beta] and also with the leadership of UH".* Another administrator adds *"currently the direction of UH work on a project of Integrated Information System. This project must be completed [...] otherwise, it really will be a great loss to the hospital. Because we will always work in a compartmentalized way".*

The tools of information exchange are mainly concentrated in the downstream level. The SC actors are not totally involved in ITC. Moreover, the upstream level is the level that has a significant lack of information sharing tool. A pharmacist argues this by saying *"we need to improve information 50% above the level of clinical services exchange tools. They must computerize".* This is also demonstrated by several verbatim :

*« To exchange information I use the personal phone...»* (doctor).

*« I have no support of exchange information that the contacts face to face exchange tool. The distance between our service and the pharmacy is very long which makes me tired by traveling to request information»* (nurse).

*"To exchange information with other members of the SC I have no computer means. I do not have a computer or phone, as I said I use my personal phone and contact directly"* (nurse).

*« To request information using my personal phone and face to face contacts»* (nurse).

Also interviewed confirm the problem of non-use of ITC. A pharmacist says *"we must educate staff to use computer. There are persons who are involved in the groupware and application of pharmacy but do not use it".* In more detail, a doctor explains this by saying *"the non-use of tools for information exchange is because of the mentality of the staff."* Another doctor added, *"The problem is of culture as we said. If you ask someone why you do not use the computer, he answer I do not have time I am very busy and if you check you will find that he worked only three hours throughout the day".*

## 4.2. Discussion of Results

The analysis results are used to compare the results with empirical research proposals. They are covered in this section à discussion to determine their level of acceptance. In this way, three degrees of acceptance will be identified (Benzidia, 2010). First, a proposal has a high degree of acceptance when the influence will live variable. Then, a proposal has a degree of acceptance part when the influence will be partial or indirect. Finally, proposals are experiencing a low degree of acceptance when the influence has not been observed in the state.

Theoretical analysis shows that the cross-functional information sharing is a key element of the SC. It coordinates the various units of the organization (Fabbe-Coste, 1998) and actions and achieves efficiency (Graw et al. 2008). Therefore the information exchanged can take three dimensions: the time dimension, the content and form (O'Brien, 1995). These are recognized as part of the coordination of activities within the SC (Ramayah & Omar, 2010).

However, the empirical analysis revealed the importance of the three main dimensions of information exchanged in the coordination. Specifically, we identified the timeliness, accuracy and the support (ITC). The availability of timely information, the accuracy of information exchanged and supports them through the information is transmitted and communicated allow different departments of the internal SC hospital to better coordinate their activities.

First, the information must be provided when needed. Deferred exchange information can lead to delays and negative impact on the work of the various actors of the SC. Thus, timely information is an important dimension. He is recognized as essential to the IFC. Therefore, we validate the proposal (P1) with a high level of acceptance.

Second, effective coordination depends not only of an exchange of timely information, but also of the accuracy of the information exchanged. The information must be correct and certified free of errors. According to this reasoning, respondents showed that the accuracy of the information exchanged plays a key role in coordinating the services of the SC. Accordingly, the proposal (P2) is of a high level of acceptance.

Finally, ITC, according to respondents, are key success factors of the SC. They help to improve the coordination between actors in facilitating the exchange of information. They offer a wide range of means of coordination of activities (intranet, internet, computers...). In the same vein, some people questioned were aware that the set up of an integrated information system (of type of ERP) enable high integration and coordination of all services of the hospital. It seems necessary it will allow each service to interact with others, synchronize and integrate data on the SC. We can deduce that the proposal (P3) is of a high level of acceptance.

To have greater visibility on our discussion, the level of confirmation of each proposal will be summarized in the following table :

**Table: Level of acceptance of research proposals**

	High degree of acceptance	Part degree of acceptance	Low degree of acceptance
<b>Proposition : The exchange of information</b>	✓		
Under Proposition 1 : The temporal dimension	✓		
Under Proposition 2 : The content	✓		
Under Proposition 3 : The form	✓		

*Source: personal elaboration*

In sum, we conclude that the exchange of information has a significant impact on the IFC in the context of the HSC and so we are faced with a high degree of acceptance in the main clause (P).

## 5. Conclusion

This paper aimed to present the main results of our empirical research into the impact of information exchange on the IFC within the SC of MUH. It allowed us, after an analyzing the literature and elaboration of proposals of our research, produce thanks to an exploratory qualitative study to determine the causal relationship between information sharing and IFC. This study confirms that the exchange of information remains a key antecedent of IFC.

### 5.1. Managerial implication

Our research would improve the knowledge of the IFC and management practices within of the Moroccan HSC. Thus, this topic causes not only of interest to researchers, but also raises many questions on the part of managers who are trying to invest in the field of hospital logistics.

This research highlights the factor of information exchange that has a significant impact on the IFC between actors of the HSC. In this perspective, managers can use a combination of dimensions of information exchanged and should consider that to have better coordination relations between the functions of the HSC, they must take into account the specific determinants in the Moroccan hospital, finally, elaborate the logistics strategies.

### 5.2. Limits and perspectives of research

Our research is characterized by two main limitations: First of all, the search is limited only to drug flux and associated information and neglects other types of pharmaceutical flows. Then, we have neglected the phenomena of interactions between variables in, which can be questionable in this area of research such as the relationship between ITC and the accuracy of the information exchanged.

Despite these limitations, this research claims to have opened a new field of research, relatively, dealing the Internal HSC in Morocco based on the qualitative method. We would like in future research to analyze the inter-organizational coordination between Moroccan hospital actors and initiate this actors to work within a process of SC Hospital Management. It is clear that substantial efforts are still needed not only by hospitals but also by all the players in the health system (public actor, the mutual sector, suppliers ...) for the coordination can occupy the prominent place should he return to HSC.



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