

## **Critical Success Factors for Warehousing Performance Improvement in Moroccan Companies**

Mohamed RAZIK<sup>1</sup>, Bouchaib RADI<sup>1</sup>, Chafik OKAR<sup>3</sup>

<sup>1</sup> Faculty of Sciences and Techniques, University Hassan 1er, Settat, Morocco

<sup>2</sup> Faculty of Sciences and Techniques, University Hassan 1er, Settat, Morocco

<sup>3</sup> School of Technology, University Hassan 1er, Berrechid, Morocco

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**ABSTRACT:** *This research aims to identify Critical Success Factors (CSF) for warehousing performance improvement in Moroccan companies. Firstly, the paper defines through a literature review the warehousing performance and explains the reasons to introduce the concept of critical success factors in this study. Next, on the basis of an action research and a survey, the importance of the warehousing function and obstacles of its performance are presented. Then, CSF for warehousing performance improvement in Moroccan companies found in this research are shown. The results may be useful for managers and specialists in warehousing as well as researchers and scholars interested in developing studies on warehousing performance improvement.*

**Keywords:** *Supply chain, warehousing, performance, critical success factors*

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### **I. INTRODUCTION**

The current increasing globalization causes a rapidly changing world. Consequently, the current economic environment is characterized by intense competition between companies. This market development has created new constraints for enterprise production systems. These changes have led companies to look for ways to improve their performance by producing at lower cost with an optimum time and an optimum quality [1]. Performance should be considered today in an overall manner (productivity, flexibility, cost, schedule, quality, safety, social performance, environmental performance...) and over the entire product life cycle (design, construction, operation destruction / recycling).

Studies have shown that the process approach is among the methods used lately for the business performance optimization; it allows a better use of resources and ensures operations that are more active [2]. Therefore, the business success is linked to the performance of their processes, especially those having a direct impact on the achievement of objectives set [3]. In modern business, this role is not only guaranteed by the manufacturing process, it is also ensured by the overall process of the companies: strategic management, customer portfolio management, supplier relationships, human resources management, maintenance of equipment manufacturing, supply chains management [4].

A study by Shahabuddin (2011) show that the performance of companies that have adopted supply chain process were better than those that did not [5]. Effective supply chain management does not concern only the freight transport between suppliers, manufacturers and end customers. It concerns all the actions from the sourcing to the final delivery, it must be synchronized and integrated with intelligent management [6]. Among the problems, is that companies often tend to optimize their own performance without considering the benefits of supply chain in a comprehensive manner [7]. Warehouses are an essential link of supply chains. Indeed, the situation of competition between companies and the need for effective supply chain management, push warehouse managers to improve performance and reduce operating costs [8]. Several studies have shown that warehouse operations performance affects the efficiency of the supply chain [9] [10]. The percentage of the research on warehousing remains low compared to the overall research on supply chain despite the existence of several research questions in this area. Our objective in this article is to study the performance of the warehousing process in supply chain, mainly the identification of critical success factors in improving this important process in supply chains. To accomplish this, we will be based on:

- Analysis of research work dealing the problems of warehousing process.
- The feedback on our warehousing projects in some Moroccan companies.
- The results of a survey and interviews with a group of Moroccan logistics managers.

This study is crucial for companies, firstly because organizations must know and be aware of the factors that will affect the success of warehousing projects. On the other hand, because there is no extensive research on critical success factors of this function. The results may be useful for managers, decision makers and specialists of warehousing and storage systems.

II. LITERATURE REVIEW

2.1 The warehousing function

Warehousing plays a significant role in modern supply chains [11]. According to the European Logistics Association, the cost of the warehousing in Europe is 24% of total logistics costs [12]. In the USA, the cost is 22% [13]. These studies show the importance of warehousing in cost terms, but it is also significant in customer service terms, warehousing is thus critical to the success or failure of many supply chains [14]. According to Werling, the role of the warehouse has changed in recent years, the importance is placed on customer satisfaction and visibility of the supply chain [15]. We find in the literature many definitions of warehousing; the table1 presents some of them:

Table 1: Definitions of the warehousing according to different authors

Definitions of the warehousing	Authors
The main function of the warehousing systems is to receive products (from inbound or manufacturing lines), to store materials until they are requested, and then, to extract products from inventory and ship them in response to the customers' orders.	[16]
Warehousing is a benefit for all activities associated with the management of a warehouse. Ie all the operations of movement of the products inside the warehouse and distribution centers.	[17]
A warehouse is a facility in the supply chain to provide value added processes and shorten response time.	[18]
Warehouses are commonly used for storing or buffering products (raw materials, goods-in-process, finished products) at and between points of origin and points of consumption.	[19]
The major roles of warehouse include: buffering the material flow along the supply chain to accommodate variability caused by factors such as product seasonality and/or batching in production and transportation; consolidation of products from various suppliers for combined delivery to customers; and value-added-processing such as kitting, pricing, labeling, and product customization.	[20]
Inventory holding and the servicing of customer orders from that inventory are key warehouse functions.	[21]
A warehouse is a facility in the supply chain to consolidate products to reduce transportation cost, achieve economies of scale in manufacturing or in purchasing.	[22]
Warehouses typically comprise a reserve storage area, where product is usually stored on pallets, as well as a picking area, where it is more common to place items on shelves or some other form of storage device. As open case stock in the picking area is depleted, new product is transferred from reserve storage to the picking area.	[23]
Warehousing can be defined as an organizational process that allows taking the necessary steps to ensure storage, prevent deterioration, for the raw Contents or the finished products necessary for sales, production or services.	[24]
Warehouses are involved in recovering products, materials, and product carriers from customers in order to redistribute them to other customers, recyclers, and original-equipment manufacturers.	[25]
From a design perspective, warehouses can be characterized by the primary functions they perform: receiving, storage, order picking and consolidation, packing, and shipping. In some cases, these are also value-added operations.	[26]
Warehouse may be viewed from three different angles: processes, resources, and organization. Products arriving at a warehouse subsequently are taken through a number of steps called processes. Resources refer to all means, equipment and personnel needed to operate a warehouse. Finally, organization includes all planning and control procedures used to run the system.	[27]
Warehousing concerns material handling activities that take place within the warehouse, receiving and shipping areas, i.e., receiving of goods, storage, order-picking, accumulation and sorting and shipping.	[28]
A primary objective of the warehousing function is to maximize the utilization of the equipment and storage space. One way to affect this is to make efficient use of the available facilities.	[29]

From the definitions presented above, we can conclude that warehouses are no longer seen as a simple storage place with no benefit, they become a dynamic place where the products are packaged and orders are aggregated and prepared. Warehousing is an important element in the goods distribution activity in all these stages: raw materials, outstanding production, finished products. It should not therefore be a feeble link in the supply chain [30]. The warehousing is viewed from different angles by the different authors who were interested in this field. There is no definition covering all aspects of the warehousing, this is why we propose for our study the following broader definition: The Warehousing is a process, which groups all activities that allow designing of a warehouse; definition of necessary resources for it operation; definition of the various operations within it and its management.

Our proposed definition is shown schematically in Figure 1:

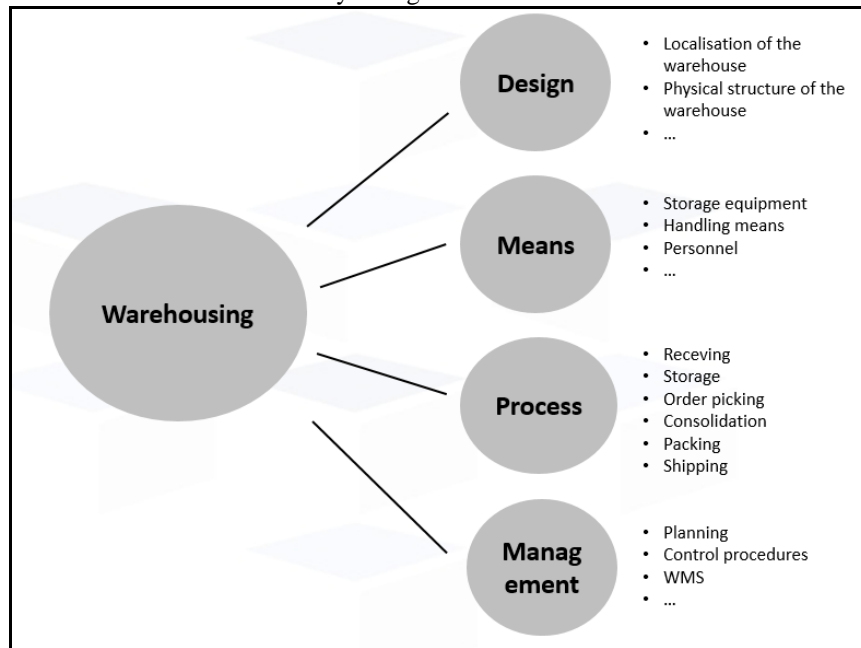


Figure 1: Schematic presentation of the Warehousing Definition

The study of the warehousing performance is crucial for companies, as it will have a direct effect on the overall performance of the supply chain. The next paragraph synthesizes the current state of knowledge relating to the warehousing performance.

## 2.2 Warehousing performance

As previously reported, warehousing is costly for enterprises, either in terms of the facilities and equipments required or in terms of human and management resources. Otherwise, the underperformance will negatively influence the achievement of customer service levels, maintaining the integrity of inventory and the operating costs [30]. The researchers studied the warehouse performance in different ways: some have analyzed the performance with respect to the objectives as long or short-term decisions, others have focused on how to measure these objectives, others are based on the type of warehouse systems [31].

The table 2 presents the performance of the warehousing as explored by some authors:

Table 2 : Performance of the warehousing according to different authors

Performance of the warehousing	Authors
Two main aspects lead to enhanced warehouse performances: the warehouse design and the operations control. The first aspect refers to the layout constraints and parameters, the storage equipment and the high-level strategic decisions on the total inventory of the facility. The second addresses the warehouse operative activities, such as put-away, replenishment and order picking, focusing on models, techniques, and methodologies to enhance the operative performances (e.g., zoning, batching, routing).	[32]
The performance of a warehouse depends on its design, which determines its structure and its management policies, which determine its behavior	[33]
The performance of a warehouse depends on four internal parameters: 1. The storage capacity; 2- The ease of access to storage locations; 3- the complexity of the internal structure; 4. The level of the information system used.	[34]
The metrics for measuring performance in a warehouse fall into three main categories which includes order fulfillment, inventory management and warehouse productivity.	[35]
There are two related but distinct approaches to warehousing performance measurement: economic (i.e., revenue related to cost) and technical (i.e., outputs related to inputs).	[36]
Warehouse design involves five major decisions: determining the overall warehouse structure; sizing and dimensioning the warehouse and its departments; determining the detailed layout within each department; selecting warehouse equipment; and selecting operational strategies.	[37]
Warehousing Performance included productivity, flexibility, and quality of outbound shipments. Operational aspects included labor, value added activities, and warehouse size, number of SKUs handled, industry sector, automation, and complexity.	[38]
Within the field of warehousing we distinguish the following criteria: investment and operational costs, volume and mix flexibility, throughput, storage capacity, response time, and order fulfillment quality (accuracy).	[39]
Performance in the warehousing and distribution industries has focused on measures such as cost as a percentage of sales, lines or cases handled per person-hour, response time, and shipping accuracy	[40]

From the literature review we have achieved, we note that the warehousing performance is defined according to different points of view; no work has addressed the warehousing performance in a comprehensive manner. For our study, we chose to analyze the performance of a comprehensive manner. For example, focusing only on management containment could improve one area but not affect the overall performance of the warehousing. For this reason, we consider in our study that the warehousing performance is reached if all its activities (as defined in the preceding paragraph) are madden in an efficient way, more precisely:

- Efficient design of the warehouse
- Efficient means for carrying out operations in the warehouse
- Efficient operations in the warehouse
- Efficient management of the warehouse

These four issues are the subject of a survey we conducted in several Moroccan companies, the objective is to determine the main factors that influence directly the performance of the warehousing process. We will be based on the concept of CSF to answer this question, the methodology and the results will be presented in the next sections.

### **2.3 Critical Success Factors**

Studies have shown that the process approach is among the methods used lately for the business performance optimization; it allows a better use of resources and ensures operations that are more active [41] [42] [43]. Therefore, the business success is related to the performance of their processes, especially those having a direct impact on the achievement of objectives set [44]. In modern business, this role is not guaranteed only by the manufacturing process, it is also ensured by the overall process of the companies: strategic management, customer portfolio management, supplier relationships, human resources management, maintenance of equipment manufacturing, supply chains management [45]. Warehousing have an essential role in global logistics systems to ensure high levels of customer service and overall performance of the supply chain [46]. For logistics managers, the warehouse is at the center of reflections and challenges as it has become a real factor in optimizing the supply chain. It is at this level where operate today, profitability gains for industrial groups [47]. On the other hand, the optimization of all different operations in the warehouse in a coordinated fashion is very complex [48]. This therefore justifies the need for research on the performance of warehousing process. The identification of factors determining the success of the performance improvement for warehousing function is a major challenge. As defined by many authors, the CSF are the limited number of areas where positive results will have effect in "successful competitive performance" for an employee, organizational unit, and organization as a whole [49]. The importance of the concept of success need not be demonstrated. Indeed, the experiences of managers record of repeated failures of some projects. Jugdev and Müller (2005) confirm that despite decades of research, projects continue to fail [50]. This provided an empirical and historical justification for the need to study the success of projects.

The development and identification of CSF have recently dominated the field of management, many researchers such as : Fortune et al (2006) [51]; Müller & Jugdev (2005) [50]; Cooke Davis (2002) [52]; Clarke (1999) [53]; Belassi et al (1996) [54]; Pinto and Slevin (1989) [55] and Kerzner (1987) [56] have attempted to identify factors for success. Their research shows that it is impossible to obtain a full and proper list for all projects. The success criteria and success factors differ from one project to another due for example the scale, uniqueness and complexity of the projects [50]. Despite much research in this area, none has not treated the CSF for warehousing process. The proposal of the CSF for improving the performance of the warehousing will meet two needs: academic needs by working on a subject not yet developed in the literature, and industrial needs by providing a tool for the mastery of the warehousing.

### **III. RESEARCH METHODOLOGY**

The main objective of this article is to identify the critical success factors for warehousing performance improvement in supply chaine. To achieve this goal, we will follow these steps:

- Study of related works dealing warehousing performance and CSF;
- Determining the importance of the warehousing;
- Identifying barriers to warehouse performance;
- Identifying the CSFs for warehousing performance improvement.

In this study, we used various scientific methods: literature review, action research, in-depth interviews, survey, critical thinking and logical deduction. The techniques used are presented in the table 3 according to the stages of the stady.

**Table 3 :** Research Methods for different stages

Stages	Research Methods
Study of related works	Analysis of literature
Determining the importance of the warehousing	Survey, Study of official reports, In-depth interview
Identifying barriers to warehouse performance	Survey, In-depth interview
Identifying CSFs for warehousing performance improvement	Action research, critical thinking, inductive reasoning, in-depth interview

The analysis of literature is used to explain the nature of warehousing process and the concept of CSFs. It is also used to know the situation of research on the performance of the warehousing and its importance in Moroccan companies. A survey with several Moroccan companies was conducted to confirm the importance of the warehousing process for their organizations and to identify barriers to its performance. Action research helped to define essential elements to be considered for better optimization of the warehousing. We used our practical experiences in warehousing project; we have been working as the project engineer especially in storage facilities and cold storage projects for many years. Based on the findings during all stages of this study, using critical thinking and inductive reasoning, we have defined along with the studied companies, through in-depth interviews with several logistics managers, CSFs for warehousing performance improvement in in supply chain.

**IV. RESEARCH FINDINGS**

**4.1 The importance of the warehousing**

In a more and more dynamic business environment, supply chain is considered as a resource base to support and be an enabler for new strategic moves on the market to improve companies performance and to gain a competitive edge [57]. Its optimization is a major issue for organizations. According to a survey by D'Avanzo et al. (2003) [58] with 636 companies among the top 3000 global companies reveals that 90% of respondents consider that the supply chain management is a critical dimension of the performance of an organization. Several authors confirm that warehouses have a strategic role in the supply chain (Bottani et al, 2015 [10]; Staudt, 2015 [31]; Öztürkoğlu, 2014 [46]; Alonso et al, 2013 [48]; Ballest et al, 2013 [9]; Mezghani et al, 2012 [59]; Mohan, 2012 [30]; Proth & Dolgui 2010 [60]; Werling, 2006 [15]). The study of warehousing performance has become an important research question due to the growing complexity of logistics networks. Indeed, warehouses are the coordinating node for material flow between the services of the company, it is further, the coordinating node between suppliers and customers [61]. Moreover, The warehousing present between 2% and 5% of the turnover of a company [62], reducing its costs has become an important business issue since it will bring significant gains to companies [63].

In Morocco, the awareness of the importance of improving the performance of critical business processes is currently greater. Indeed, The Moroccan Company operates in an environment characterized by a competitive offer increasingly strong requirement for competitiveness increasingly acute and expectations of customers increasingly high [64]. To address these issues and to improve performance and competitiveness, all processes must be improved. According to Naciri [65], the organization of the supply chain of Moroccan companies generates costs that penalize competitiveness. The links in this chain must be therefore mastered and optimized to gain in overall performance. According to a report by the World Bank and the Ministry of Equipment and Transport of the Kingdom of Morocco in 2006, it was reported that the poor organization of warehousing is one of the obstacles to the development of modern logistics in Morocco [66]. Furthermore and according to a study by the Centre for Transportation Studies for the Western Mediterranean, the level of warehousing services in Morocco is relatively low and the technical conditions under which it occurs are lower than the standards [67]. Particular intention must therefore be given to the performance of the warehousing in Moroccan companies, it is not the construction of warehouses that is difficult, but it is the management of these units that can be problematic because it requires needs in know - how Logistics [65].

On the other hand, Morocco lags far behind in terms of logistics platforms [68]. This delay will be caught up with the national strategy of logistics development by creating a network of logistics centers in different morrocan cities [69]. Once these projects are completed, it will be essential to master the warehousing function for better management and operation of these platforms. We are therefore convinced that the CSF theory gives a good basis to determine what criteria should be followed for the implementation and management of warehousing within companies to better control its performance.

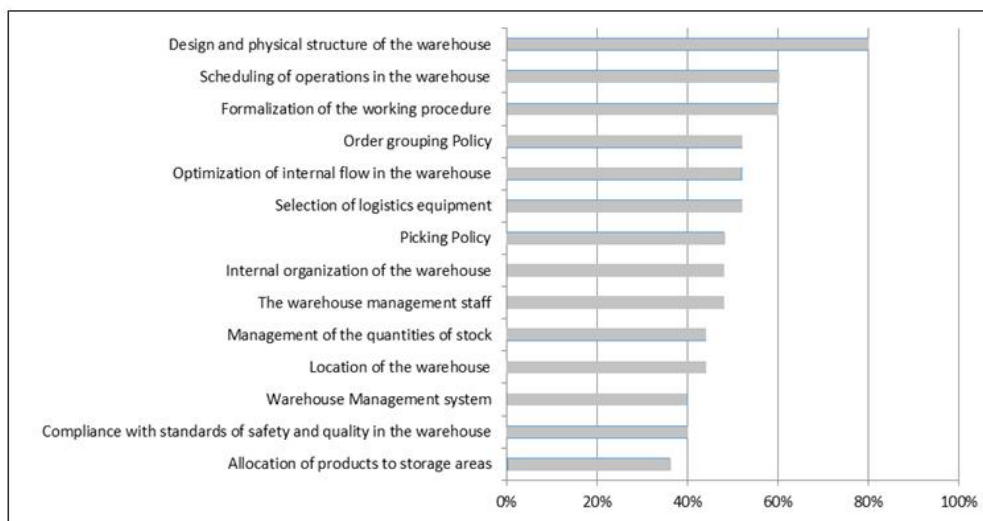
**4.2 Warehousing performance obstacles**

To identify warehousing performance barriers, we developed a questionnaire. It contains four sections: General information about the company, warehouse design, general management of the warehouse and daily management of the warehouse. The questionnaire was sent by mail to hundred thirty major Moroccan companies were selected from different industries using Kompass Morocco. After several reminders and six months of waiting, we received 25 complete responses from hundred and thirty questionnaires sent, three companies did



not complete the questionnaire and no response has been received to date from 102 other companies. The questionnaire respondents were logistics managers and store managers. The complete response rate was 19%, which did not range the targeted overall response rate of over 20% for a valid assessment. For example, Malhotra (1998) [70] perceived that a response rate over 20% was required for a positive assessment of mail survey results. However, a response rate below 20% for a mail survey is not rare in the supply chain literature (Mentzer et al. 1992 [71]; Murphy & Daley 1994 [72]; Pedersen & Gray 1998 [73]; Wood & Nelson 1999 [74]; Lieb & Miller 2002 [75]; Min & Lambert 2002 [76]; Autry et al. 2005 [77]). Low response rates are a current worry in conducting mail surveys [78] [79]. For mail surveys, response rates in the neighborhood of 10–20% are considered satisfactory in general [80] [81].

The average turnover of the sample is of the order of 300 million MAD, 88% of sample firms have warehouses. Their existence is a necessity for 100% of logistics managers interviewed, either for storage needs of raw materials, finished products or spare parts for production equipment. Despite the small number of our sample, its very satisfactory properties have encouraged us to continue our study to identify warehousing performance obstacles [82]. The results of the questionnaire have identified major problems handicapping improving the performance of the warehousing in the Moroccan companies. The first problem encountered in relates to the design and definition of the physical structure of the warehouse, this parameter is related to the production capacity and its evolution in the future, it also depends of the turnover rates of stock, and logistics equipment used (storage and handling equipment). The choice of these is also among the obstacles to the performance of the warehousing. Criteria related to the management of the warehouse are cited among the obstacles, for example: management of internal flows, grouping political, picking policy, management of the quantities of stock, use of information systems, allocation of products to areas storage. The Figure No. 2 summarizes the results obtained and class the main obstacles faced by logistics managers by percentage of confirmations of the companies surveyed.



**Figure 2:** The main obstacles of the Warehousing in Moroccan firms

The Understanding of the obstacles faced by logistics managers from the survey presented above will be the beginning for categorizing the important CFS for warehousing performance improvement. In the next section, we will present the main criteria identified.

#### **4.3 Critical Success Factors for warehousing performance improvement**

In addition to the above results, we conducted direct interviews with logistics managers to check the parameters influencing the success of their warehousing projects. All met managers confirm that the study of the warehousing performance is crucial for companies because they must know and be aware of the factors that will affect the performance of their warehouses. We also based on our feedback in projects of logistic facilities installation that we have made within Moroccan enterprises to identify the CSF for improving the performance of the warehousing. We classified the CSFs identified into four categories reflecting the four components of the warehousing function defined in the previous sections. The table below summarizes them:

**Table 5:** Critical Success Factors for warehousing performance improvement

<b>Critical Success Factors for the component “Design of the warehouse”</b>	<ul style="list-style-type: none"> <li>▪ Definition of an optimal location of the Warehouse</li> <li>▪ Definition of an optimal design of the warehouse</li> <li>▪ Definition of functional areas in the Warehouse</li> <li>▪ Definition of warehouse storage capacity</li> <li>▪ Definition of the developments of the warehouse storage capacity in the future</li> </ul>
<b>Critical Success Factors for the component “Means for the warehouse”</b>	<ul style="list-style-type: none"> <li>▪ Selection of the appropriate storage systems</li> <li>▪ Selection of the appropriate handling equipment</li> <li>▪ Definition of the necessary and efficient warehouse staff</li> <li>▪ Use of ICTs</li> </ul>
<b>Critical Success Factors for the component “Operations in the warehouse”</b>	<ul style="list-style-type: none"> <li>▪ Definition of a rule for the allocation of products to the functional areas</li> <li>▪ Definition of a rule for the allocation of products to the storage areas</li> <li>▪ Definition of a policy of picking</li> <li>▪ Definition of a policy of delivery</li> <li>▪ Setting a policy for the return processing</li> <li>▪ Optimization of internal logistics for operations in the warehouse</li> </ul>
<b>Critical Success Factors for the component “Management of the warehouse”</b>	<ul style="list-style-type: none"> <li>▪ Definition of inventory management policy</li> <li>▪ Definition of the staff allocation procedure to different missions</li> <li>▪ Definition of the quality control procedures in the warehouse</li> <li>▪ Definition of the security control procedures in the warehouse</li> <li>▪ Formalization of all working procedures</li> <li>▪ Use of a warehouse management information system</li> </ul>

## V. CONCLUSION

Currently, companies operate in a context characterized by strong competition. They must master and optimize all of their processes especially those with a direct impact on their yields and their efficiencies. The warehousing is a critical process in the supply chain, which has a direct influence on their overall performance. In our opinion, research on understanding and identification of CSF is required. This is an important step towards strengthening the chances of success of the performance improvement of this process. The underestimation of the CSF or their ignorance can lead to failure of the successful execution of a warehousing project. Our article makes an effort to contribute to the development of a study on the CSF for improving the performance of the warehousing. It explores the importance of this function survey on its barriers for logistics managers, and identifies a comprehensive set of CSF. In our view, the mastery of the warehousing is a challenge and, therefore, is an interesting research topic. Given the limitations of literature on this subject and the scarcity of empirical studies on the warehousing in the Moroccan context, it is necessary to dedicate future research efforts in this area. It is necessary to conduct further work on the proposal management tools for maximizing the performance of warehouses based on CSF studied in this article. Indeed, these tools should allow companies to identify the general characteristics of their storage process and should allow to conduct an assessment of this process. The company will then implement improvements and action plans that will enable it to make progress. This track will be considered as a future work.

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