

Development of a maturity model for the warehousing function in Moroccan companies

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Abstract— The warehousing function is a very critical function in the supply chain. It is the coordinating node of material flow between the services of the company; it is also the coordinating node between suppliers and customers. In the actual market environment characterized by strong competition, companies are called to improve their process. Given its criticality, optimizing the warehousing function will influence the overall performance of these companies. The aim of this article is therefore to provide a tool for improving the warehousing process; it will be "a maturity model for the warehousing function in Moroccan companies". This article will answer two needs: An Academic requirement by proposing a model that is not yet developed in the literature and an industrial need by offering a tool for improving the warehousing performance in different companies.

Keyword- Warehousing, supply chain, Maturity models, Performance.

I. INTRODUCTION

Supply chain management (SCM) has been a major element of competitive strategy to improve organizational productivity and effectiveness [1]. It is characterized by many activities and actors that usually have conflicting objectives [2]. The performant organization of all the logistic activities that take place within a supply chain have a significant impact on the all supply chain processes and on supply chain internal costs as well [3].

Warehousing plays a significant role in modern supply chains [4]. According to the European Logistics Association, the cost of the warehousing in Europe is 24% of of total logistics costs [5]. In the USA, the cost is 22% [6]. 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 [7]. 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 [8].

Warehousing have an essential role in global logistics systems to ensure high levels of customer service and overall performance of the supply chain [9]. 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. The management of the warehouse may intensely affect supply chain performances. While there are broadly accepted benchmarks for different warehouse functions such as order picking, the overall technical efficiency of warehouses is little studied [10]. This creates therefore a need for development of tools for assessment the warehousing function for better its performance improvement.

The maturity models address the need for process improvement [11]. Their use for self-assessment should lead to improved levels of performance by improving maturity levels of performance management practices. [12]. There are many maturity models developed to improve organizations decision-making and strategic thinking [13]. However, none of these models of maturity treats the warehousing function.

In this article, we will propose a maturity model for the warehousing function in Moroccan companies based on the concept of critical success factors (CSFs) [14]. The maturity model developed will be a new method that may help Moroccan companies to better identify, explain, assess and improve the warehousing function.

II. THE WAREHOUSING FUNCTION

We find in the literature many definitions of the warehousing; the table I presents some of them.

TABLE I. Definitions of the warehousing according to different authors [15]

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] Accorsi and al. (2013)
The main processes that take place within a warehouse are: items reception, items storage, items retrieval, items picking and items shipping.	[17] Longo, F. (2011)
Warehousing is a benefit for all activities associated with the management of a warehouse. I.e. all the operations of movement of the products inside the warehouse and distribution centers.	[18] Carrera (2010)
A warehouse is a facility in the supply chain to provide value added processes and shorten response time.	[19] Gong and al. (2008)
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.	[20] De Koster et al. (2007)
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.	[21] Gu and al. (2007)
Inventory holding and the servicing of customer orders from that inventory are key warehouse functions.	[22] Baker (2007)
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.	[23] Bartholdi and al. (2006)
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.	[24] Cormier, G. (2005)
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.	[25] Ferrin (2003)
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.	[26] De Koster et al. (2002)
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.	[27] T. Govindaraj and al (2000)
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.	[28] Rouwenhorst (2000)

From the definitions presented, 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, and finished products. It should not therefore be a feeble link in the supply chain [29].

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 means for it operation; definition of the various operations within it and its management.

The study of the warehousing performance is crucial for companies because it will affect directly on overall supply chain performance. The next paragraph synthesizes the current state of knowledge relating to the warehousing performance.

III. 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, main-taining the integrity of inventory and the operating costs [29].

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 [30].

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

TABLE II. Warehousing performance according to different authors [15]

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).	[16] Accorsi and al. (2013)
The performance of a warehouse depends on its design, which determines its structure and its management policies, which determine its behavior	[31] Goetschalckx (2012)
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.	[32] Manzini (2012)
The metrics for measuring performance in a warehouse fall into three main categories which includes order fulfillment, inventory management and warehouse productivity.	[33] Ramaa (2012)
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).	[34] Johnson and al. (2010)
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.	[21] Gu and al. (2007)
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.	[35] De Koster and Warffemius (2005)
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).	[36] Rouwenhorst and al (2000)
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	[37] Forger (1998)

From the literature review that 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 a performant way, more precisely:

- Performant design of the warehouse
- Performant means for the warehouse

- Performant operations in the warehouse
- Performant management of the warehouse

These four issues are the subject of a survey that we have conducted in several Moroccan companies; the objective is to determine Critical Success Factors CSFs that influence directly the performance of the warehousing process. The results of this survey will be presented in the next section.

IV. CRITICAL SUCCESS FACTORS (CSFs) FOR WAREHOUSING PERFORMANCE IMPROVEMENT

As defined by Rockart and Bullen, 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 [38].

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. This provided an empirical and historical justification for the need to study the CSFs [39].

The development and identification of CSF have recently dominated the field of management, many researchers such as: Fortune et al (2006) [40], Müller & Jugdev (2005) [39], Cooke Davis (2002) [41], Clarke (1999) [42], Belassi et al (1996) [43], Pinto and Slevin (1989) [44] and Kerzner (1987) [45] 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 factors differ from one project to another due for example to the scale, uniqueness and complexity of the projects [39]. Despite much research in this area, none has treated the CSFs for warehousing performance improvement.

To identify CSFs for warehousing performance improvement, we developed a questionnaire aimed at identifying major problems handicapping warehousing performance improvement in the Moroccan companies. 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 selected from different industries using Kompass Morocco. After several reminders and six months of waiting, we received 25 complete responses, 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) perceived that a response rate over 20% was required for a positive assessment of mail survey results [46]. However, a response rate below 20% for a mail survey is not rare in the supply chain literature (Mentzer and al. 1992 [47], Murphy & Daley 1994 [48], Pedersen & Gray 1998 [49], Wood & Nelson 1999 [50], Lieb & Miller 2002 [51], Min & Lambert 2002 [52], Autry and al. 2005 [53], Min 2006 [54]). For mail surveys, response rates in the neighborhood of 10–20% are considered satisfactory in general (Yu and Cooper 1983 [55], George and Mallery 2001[56], Gunasekaran & al 2004 [57], Min 2006 [54]).

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 CSFs for warehousing performance improvement [57].

The results of the survey have identified major barriers handicapping warehousing performance improvement in the Moroccan companies. In addition to the survey 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 CSFs 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 III summarizes them:

TABLE III. Critical Success Factors (CSFs) for warehousing performance improvement

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

The study of the CSFs for warehousing performance improvement will serve us for the development of the maturity model.

V. MATURITY MODEL FOR THE WAREHOUSING FUNCTION IN MOROCCAN COMPANIES

A. Why using maturity models?

Firms look increasingly to the development of new tools and models to better manage their projects for ensuring the fulfillment of objectives, for increasing the probability of success, and for ensuring the overall performance of the company. In this context, more and more organizations are relying on process improvement to improve their probability of success [58]. Among the tools used for process improvement, we find the maturity model [59].

Many works in various industrial sectors have shown the benefits of using maturity models and the relationship between the improvement of maturity and performance (Ibbs & al 2004 [60], Cooke-davies 2004 [61], Qureshi & al 2009 [62], Pöppelbuk & Röglinger 2011 [63]). They uphold organizational learning and enable efficient assessment of the performance management practices of the firms [12]. Their use for self-evaluation should result in evolution in the maturity levels of performance management practices that should effect positively the improvement of the levels of performance [12].

B. The concept of maturity models

Maturity describes a state of being complete or perfect [64]. To achieve a desired state of maturity, an evolutionary transformation path from an initial to a target stage must be advanced [65].

The concept of the process maturity was used for the first time in the Total Quality Management (TQM) movement and it was broadly implemented in “Capability Maturity Model” for software organizations [66]. Then this concept was adopted in organizational process and project management [67].

Maturity models plays the role of a structured framework for the radical growth of performance within projects or programmes in organizations. They help in evaluating the organizational weaknesses and strengths and in carrying the organization to the next level of maturity or the realization of the goals to be achieved [68]. They offer tools of detecting some crucial steps to be taken, the tasks that are necessary to realize and the series of events needed to accomplish important and quantifiable results [69].

The concept of all models is founded on the fact that the changes reached over time can be provided and regulated [70]. According to Klimko 2001 [71], Maturity models have the following proprieties:

- The development of an entity is simplified and defined with a limited number of maturity levels.
- Levels are described by certain requests that the entity has to complete on that level.
- Levels are successively ordered, from an initial level up to an ending level.
- During progress, the entity is developing forwards from one level to the next one.

C. Maturity model for the warehousing function

Since the Software Engineering Institute has launched Capability Maturity Model a few years ago, scientists and experts have developed hundreds of maturity models for various application areas [63]. Some of this maturity models are exposed in literature and applied to multiple domains such as Testing Organization, Project Management, Data Management, People, Systems Security Engineering, Helpdesk and so on [72]. However, despite the existence of maturity models for the supply chain (McCormack & al 2008 [73], Reyes & al 2010 [74]) and performance measurement systems (Wettstein and Kueng 2002 [75]), there is no specific maturity model for the warehousing function.

Furthermore, warehousing function is very critical in a supply chain as previously demonstrated. Companies are forced to improve their warehousing operations in today's competitive market environment [33]. To achieve high performance objectives of warehousing, means needs to be developed to remove any waste from the warehouse, to rationalize its operations, and improve performance in every aspect of warehousing activities [54].

This is why we propose in this article a new approach to improve the performance of the warehousing function based on Maturity model, which may better identify, explain, assess and improve this critical function in a supply chain.

D. Development of a maturity model for the warehousing function in Moroccan companies

Given the need for a model that assesses the maturity of the warehousing function, and given the absence in the literature of a specific maturity model to this function, we develop in this paper a preliminary version of a maturity model for warehousing function in Moroccan companies based on the concept of CSFs. The proposed model will be used to identify and exploit the strengths and weaknesses of the warehousing function in Moroccan companies. It will serve as an assessment tool that will improve warehousing performance and consequently the performance of the supply chain and companies in general.

Literature overview shows that models for different domains evolve gradually, that these same models are improved and changed over time and that authors often build and improve their models based on the experience of other authors [76] [77].

The structure of our maturity model is built upon the following three dimensions:

Dimension 1 : Maturity level dimensions

Dimension 2 : The four main components of the warehousing function

Dimension 3 : Critical Success Factors (CSFs) for warehousing performance improvement in Moroccan companies

The first dimension is related to maturity levels, most maturity models measure the maturity through the achievement of some levels range in general from Level 1 to Level 5. In our case, we take a scale of 1 to 3 since we propose a new model that is not developed in the literature, and to facilitate its implementation by Moroccan companies:

- Level 1(initial): there is no process area and process is chaotic;
- Level 2 (defined) : is the level where warehousing function processes are documented, standardized, and integrated into a standard implementation process for the organization and;
- Level 3 (managed): warehousing function process and activities are controlled and managed based on quantitative models and tools.

As the performance of the warehousing depends on components related to CSFs identified above, the second dimension of our model will be the four main components of the warehousing function:

- Component 1 : Design of the warehouse,
- Component 2 : Resources for the warehouse,
- Component 3 : Operations in the warehouse
- Component 4 : Management of the warehouse.

The third dimension will be the CSFs for warehousing performance improvement in Moroccan companies. The calculation of maturity level is illustrated in the table IV 1 below:

- The maturity level of the CSF j for component i :
 - M CSF ij
- The maturity level of the component i :
 - M component i = min (M CSF ij)
j = 1 ... m
- The maturity level of the Warehousing function :
 - M Warehousing = min (M component i)
i = 1... n

TABLE IV. The conceptual framework of the proposed maturity model for the warehousing function

Components	CSFs	Level 1	Level 2	Level 3	Maturity		
					CSF	Components	Warehousing
Component 1	CSF 11	Initial	Defined	Managed			M Warehousing
	...	Initial	Defined	Managed			
	...	Initial	Defined	Managed			
...	...	Initial	Defined	Managed			
	...	Initial	Defined	Managed			
Component i	...	Initial	Defined	Managed		M Component i	
	CSF ij	Initial	Defined	Managed	M CSF ij		
	...	Initial	Defined	Managed			
...	...	Initial	Defined	Managed			
	...	Initial	Defined	Managed			
Component n	...	Initial	Defined	Managed			
	CSF nm	Initial	Defined	Managed			

Based on this principle, we can locally assess the level of maturity and obtain a score for a given CSF, and consequently to a particular component of the warehousing function. The maturity level of a component may not be the same as in the previous one, as CSF for a component are not the same as for another, so the mastery of processes associated with each CSF must be assessed.

E. Implementation of the maturity model for the warehousing function in Moroccan companies

For the implementation of the maturity model, we propose an evaluation methodology based on questionnaires that will provide the maturity levels for each CSF, and therefore by aggregation for a component, and for the warehousing function.

We propose to define a team composed of logistics managers and the responsables for each component to assess, to perform the audit and recover as much information as possible to give a reliable rating for the maturity that best reflects the current state of the warehousing.

The questionnaires are constructed according to the maturity levels defined for each CSF j (each CSF corresponds to three questions). These questions are generic and can be applied in all components. The difference in the assessment is made by the answers that will depend on the state of the CSF.

For each question, there are three possible answers: yes, no and does not apply.

To get the maturity level of an CSF j for a component i, M CSF ij, we compare the responses to maturity scales (ranging from level 1 to 3). To obtain it, a positive answer to the question of the same level is necessary, as in most maturity models (CMMI 2006 [78]) it must have completely crossed a maturity level before proceeding to the next.

The results of the evaluation are used to identify areas for improvement in the components of the warehousing function through the comparison between the levels of maturity. When the the warehousing function reaches a specified maturity level in a CSF, the improvement roadmap includes the next level. If level 3 is reached, the companie must keep it.

We describe the maturity model for the warehousing function in Moroccan companies in the table V :

TABLE V. Maturity Model for the warehousing function in Moroccan companies

Component Maturity Model For Warehousing Function	CSFs for Warehousing Performance Improvement	Maturity level 1 (Initial)	Maturity level 2 (Defined)	Maturity level 3 (Managed)
<i>Design of the warehouse</i>	Definition of an optimal location of the Warehouse	The location of the Warehouse is not studied	The location of the Warehouse is defined	The location of the Warehouse is defined optimally
	Definition of an optimal design of the warehouse	The design of the warehouse is not studied	The design of the warehouse is defined	The design of the warehouse is defined optimally
	Definition of functional areas in the Warehouse	The functional areas are not defined in the Warehouse	The functional areas are defined in the warehouse	The functional areas are defined in the warehouse optimally
	Definition of warehouse storage capacity	The warehouse storage capacity is not defined	The warehouse storage capacity is defined	The storage capacity is considered in the design of the warehouse
	Definition of the developments of the warehouse storage capacity in the future	The evolution of the warehouse storage capacity in the future is not defined	The evolution of the warehouse storage capacity in the future is defined	The evolution of storage capacity in the future is considered in the design of the warehouse
<i>Means for the warehouse</i>	Selection of the appropriate storage systems	The storage systems are not used	The storage systems are used	Storage systems used are optimized
	Selection of the appropriate handling equipment	The handling equipment are not used	The handling equipment are used	Handling equipment used are optimized
	Definition of the necessary and efficient warehouse staff	The warehouse staff is not defined	The warehouse staff is defined	The warehouse staff is defined optimally
	Use of ICTs	ICTs are not used in the warehouse	ICTs are used in the warehouse	ICTs used in the warehouse are optimized
<i>Operations in the warehouse</i>	Definition of a rule for the allocation of products to the functional areas	The allocation of products to functional areas is done randomly	A rule for the allocation of products to the functional areas is defined	The allocation of products to the functional areas is optimized
	Definition of a rule for the allocation of products to the storage areas	The allocation of products to the storage areas is done randomly	A rule for the allocation of products to the storage areas is defined	The allocation of products to the storage areas is optimized
	Definition of a policy of picking	The picking policy is not defined	The picking policy is defined	The picking policy is optimized
	Definition of a policy of delivery	The delivery policy is not defined	The delivery policy is defined	The delivery policy is optimized
	Setting a policy for the return processing	The return processing policy is not set	The return processing policy is defined	The return processing policy is optimized
	Optimization of internal logistics for operations in the warehouse	Internal logistics for operations in the warehouse is done randomly	A rule for internal logistics for operations in the warehouse is defined	Internal logistics for operations in the warehouse is optimized

Management of the warehouse	Definition of inventory management policy	The inventory management policy is not set.	The inventory management policy is defined	The inventory management policy is optimized
	Definition of the staff allocation procedure to different missions	The staff allocation procedure for different missions is not defined	The staff allocation procedure to different missions is defined	The staff allocation procedure to different missions is optimized
	Definition of the quality control procedures in the warehouse	The quality control procedures in the warehouse are not defined	The quality control procedures in the warehouse are defined	The quality control procedures in the warehouse are used and improved continuously
	Definition of the security control procedures in the warehouse	The security control procedures in the warehouse are not defined	The security control procedures in the warehouse are defined	The security control procedures in the warehouse are used and improved continuously
	Formalization of all working procedures	The working procedures in the warehouse are not defined	The working procedures in the warehouse are formalized	The formalized working procedures in the warehouse are used and improved continuously
	Use of a warehouse management information system	A WMS is not used in the warehouse	A WMS is used in the warehouse	The WMS used in the warehouse is optimized

VI. CONTRIBUTION

Based on the literature review, there is no specific maturity model for the warehousing function. In addition, we have found in our study that this function plays a vital role in companies supply chain. Therefore, we aim by this article to enrich the research area and develop a new approach for organizations to achieve their supply chain objectives with effectiveness and efficiency. Furthermore, we contribute by our research to offer to managers, professionals and any person interested in study of warehousing a roadmap and models of best practices in order to improve their warehousing function and consequently to improve their supply chain.

By integrating the concept of CSFs, we have developed a Maturity Model for the warehousing function in Moroccan companies. It provides a methodology and new concept for companies to develop an improvement roadmap to its warehousing function by reaching specified maturity level.

The results of the evaluation based in our maturity model are used to identify areas for improvement in the components of the warehousing function through the comparison between the levels of maturity. When the warehousing function reaches a specified maturity level in a CSF, the improvement roadmap includes the next level. If level 3 is reached, the company must keep it.

VII. CONCLUSION

In today's competitive market environment, companies are continuously forced to improve their warehousing function, which is critical in a supply chain. To meet high performance goals of warehousing, tools must be developed to eliminate any waste from the warehouse, to streamline its operations, and improve efficiency in every aspect of warehousing activities.

In this context, we have proposed the development of a Maturity Model because many works in various industrial sectors have shown the benefits of using this tool and the correlation between the improvement of project maturity and project performance and because there is no specific maturity model for the warehousing function.

Based on the critical success factors and the concept of maturity, a four-component Maturity Model for the warehousing function in Moroccan companies has been developed. The suggested Maturity Model makes it possible for companies to identify, explain, assess and improve this critical function in a supply chain.

For future work, we will present an empirical study and a case study in a Moroccan company to help validate and demonstrate the effectiveness of the maturity model proposed for the warehousing function in Moroccan companies.

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