

Sustainable Distribution Networks Adoption in Moroccan industry: barriers and instigators

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Abstract

Distribution Networks attracted much attention lately from academics and industrials, for their strategic role for any company that seeks a responsible brand image. From this perspective, our main objective in this paper is to use a survey methodology over a sample of 30 Moroccan companies from different sectors in order to study and verify hypotheses established from the literature to determine the instigators and the barriers to achieve sustainability. Research questions were stated and questionnaires were distributed to the top management and heads of logistics departments in order to have the necessary data that served as a basis for a quantitative analysis. The results obtained from this study regarding sustainable Distribution Networks helped to highlight the correlation between the sector of activity, the firm size and the Moroccan institutional framework for sustainable development. Finally, we present the results and draw conclusions.

Keywords

Distribution Networks, sustainability, survey, Moroccan industry.

1. Introduction

Nowadays, with the rapid economic growth, society is more aware of the climate change and its consequences. Since we live in a very emerging world, in order to meet the globalization standards, the logistics sector is responsible for the increase of the Global Warming Potential (GWP). In fact, according to the predictions of the International Energy Agency, the transportation emissions are going to increase by 50 % before 2030 and by 100 % before 2050 from the levels of 2007 (IEA, 2009).

Thus, companies and industrials are facing new challenges, not only to minimize the operational costs of their distribution networks. But also to consider the social and environmental impacts in the sake of a sustainable image. The consensus made between the three pillars of sustainable Development (see figure 1) is usually called the « Triple Bottom Line » (Profit, People and Planet).

Having said that, it appears like if the only motivation to go for a sustainable strategy is the pressures exerted from the regulation and society. But, in today's modern society this traditional approach has changed (SAADE, et al., 2016). Companies are taking more proactive approaches toward their supply chain and especially their distribution networks. Not only to sustain a good brand image but are also motivated by the great potential of the marketing for their sustainability.

However, with all the debate about the motivators and what instigate industrials to adopt a sustainability strategy, there are barriers that prevent the achievement of sustainability or even the adoption of sustainable measures. For the Moroccan context, a rich institutional framework has been set up to upgrade the sustainability of Moroccan companies. From this perspective, the aim of this article is to conduct a survey on the Moroccan industry, in order to study and verify hypotheses established from the literature to determine the instigators and the barriers to achieve sustainability. The rest of the paper is organized as follows: The first part of the article exposes a literature review, the second part,

describes the methodology used to conduct the survey and the quantitative analysis. The third part, presents the finding and discuss the results. Finally, we end our article with a conclusion and future research perspectives.

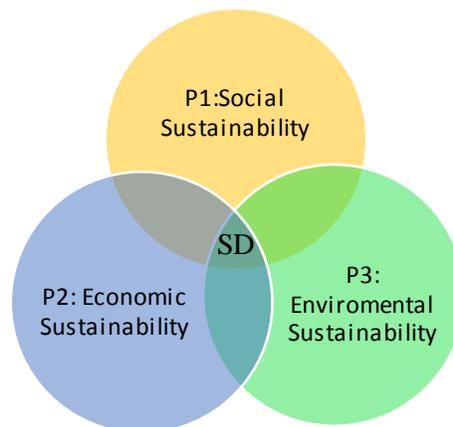


Figure 1. Pillars of Sustainable Development (SD), [source: (Merad , et al., 2013)]

2. Literature review

Every decision made for the design of distribution networks must involve a sustainable vision from the choice of the location of distribution centers, transportation modes to the packaging itself. But, for industrials, integrating sustainability to the practices of Supply Chains has to be prepared and commitments to sustainability decisions has to be guaranteed. The challenge faced by companies for linking the economic and the social performances was studied in the paper of (Jackson, et al., 2006), they identified the institutional determinants that affect the CSR for western European firms. (Mani, et al., 2016) Presented a paper where they studied the social issues related to manufacturing Supply Chains. An interview methodology was used in the study to retrieve quantitative data from the Indian manufacturing sector and measurement for Sustainable Supply Chains were proposed and validated. (Wan Ahmad, et al., 2016) Conducted a survey over 81 Oil and Gas Companies to study the commitment to sustainability and also the preparedness of their supply chain to such decisions.

For the motivators for the adoption for a sustainable strategy, (Turner et al, 2014) were convinced that the top management leadership is mainly responsible for adopting sustainable measures in Supply Chains. Employee involvement was introduced by (Wagner et al, 2010) as an important factor that influence the success of sustainable development. (Mariadoss, et al., 2016) investigated the relationships between a firm's orientations and sustainable supply chain practices, 149 managers in the U.S. manufacturing and service industries were questioned to test the paper's hypothesis. (SAADE, et al., 2016) Presented in their article a dual factor theory for the adoption of Green Sustainable Chains Management practices in the Lebanese manufacturing industry. (Raut, et al., 2017) Explored the interactions among the barriers which restrain the practice of energy saving in China. On the other hand, (Grzybowska, 2012) presented an Interpretive structural modelling to identify the interactions between the enablers of sustainability in Supply Chains, the study will provide a basis for decision making to choose which are the enablers that require more attention. (Walker, et al., 2008) Conducted an n explorative study is conducted based on interviews from seven different private and public sector organizations to identify the main drivers and barriers to environmental practices in supply chain management. In 2015, (Tay, et al., 2015) reviewed the literature to highlight the major instigators and barriers to sustainability in operations management.

2.1 Sustainable Development and CSR

Sustainable Supply Chain Management (SSCM) is adding the sustainable value to the practices of Supply Chain Management. A lot of confusion exist between the two concepts: Sustainable Development and Corporate Social Responsibility (CSR).

CSR have many definition, However the European Commission defines the CSR as *“the responsibility of enterprises for their impact on society. CSR should be company led. Public authorities can play a supporting role through a smart mix of voluntary policy measures and, where necessary, complementary regulation”*.

On the other hand, in 1987 the Brundtland report “our common future” defined Sustainable development as “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. The sustainable development mentioned below, is usually referred to as the concept of Triple Bottom Line (The concept was initially introduced by the European Commission in 2000) which is the implementation of the notion of sustainable development in a company by the evaluation of the performance of the company under three angles (figure 1):

- **Social** (P1: people): Social consequences and impacts of the activity of the company on the community and for all stakeholders;
- **Environmental** (P3: Planet): Compatibility between the activity of the company and the preservation of the ecosystems
- **Economic** (P2: Profit): Analyze the financial performances and the capacity to contribute to the economic development of the company.

2.2 The Moroccan institutional Framework for Sustainable Development

The Moroccan institutional Framework is in constantly changing in favor of adopting more regulations and laws that promotes sustainable development measures for industrials. The next section, is dedicated to the commitment of the Moroccan government to encourage sustainability.

a- Actions against corruption

Morocco is one of the countries that signed in 2003, the Agreement of the United Nations for the fight against corruption. Besides that, the Moroccan government has established an action plan in 2005, and implemented the central Authority for the prevention of the corruption (ICPC) in 2008 (BOUMAHDI, et al., 2015).

b- The Moroccan Labor code

The Moroccan labor code is aligned with the international standards and pictures the principles fixed by the signed agreements with the United Nations.

c- The Moroccan strategy for sustainable development 2015-2020

This strategy has been effective since 2015 and it's characterized by many efforts adopted and established by the Moroccan government to encourage industrials into embracing more sustainable practices (Maroc, 2014):

- **Strengthening of the economic frame and the liberal orientation:** by reducing the debt and the preservation of the macroeconomic balances and creating multiple free trade areas.
- **Implementation of big transportation infrastructures** such as: highways, airports and Seaports.
- **Implementation of voluntarist sectorial policies:** Green Morocco plan, Plan of Industrial Acceleration 2010 and 2020, Halieutis plan, Rawaj plan, Morocco Digital Plan, Logistics strategy 2030 and many more strategies.
- **Implementation of a politics to promote the use of Renewable energies and of the energy efficiency:** Law 13-09, the solar plan: Noor Park, the Wind power Plan.
- **Outline law n°99-12 carrying national charter of the environment and the sustainable development**
- **The National Initiative for the Human Development (INHD)**

In spite of the granted efforts, numerous stakes still remain to recover to allow the country to sit the bases of a sustainable development.

d- The CSR Label of the CGEM

The General confederacy of companies in Morocco (CGEM) launched an initiative on December 14th, 2006 for CSR and created the charter of social responsibility of the CGEM which was adopted by the National Council of the Company, statutory and decision-making organ of the Confederacy.

The 9 axes of commitments to the CSR Charter of the CGEM are:

- Respect of humans rights;
- Continuous improvement of the work conditions and the professional relations;

- Protecting the environment;
- Preventing corruption;
- Respecting the rules of the healthy competition;
- Strengthening the transparency of the corporate governance;
- Respecting the interests of the customers and the consumers;
- Promote the social responsibility of the suppliers and the subcontractors;
- Develop the community involvement.

3. Methodology

In this article, we contribute to the literature of sustainable Distribution networks by exploring the Motivations and the barriers to sustainability in the Moroccan industry. Both the motivations and the barriers were grouped into internal and external factors (Wan Ahmad, et al., 2016). At first, we will present research questions and hypothesis which either we are going to accept or refuse. To gather the data used for the quantitative analysis, a questionnaire was developed and distributed to different manufacturing companies which operate in different sectors. The questionnaire was prepared and based on a literature review to identify the key instigators and barriers to sustainability for distribution networks. Figure 2 describes the methodology used to conduct the survey.

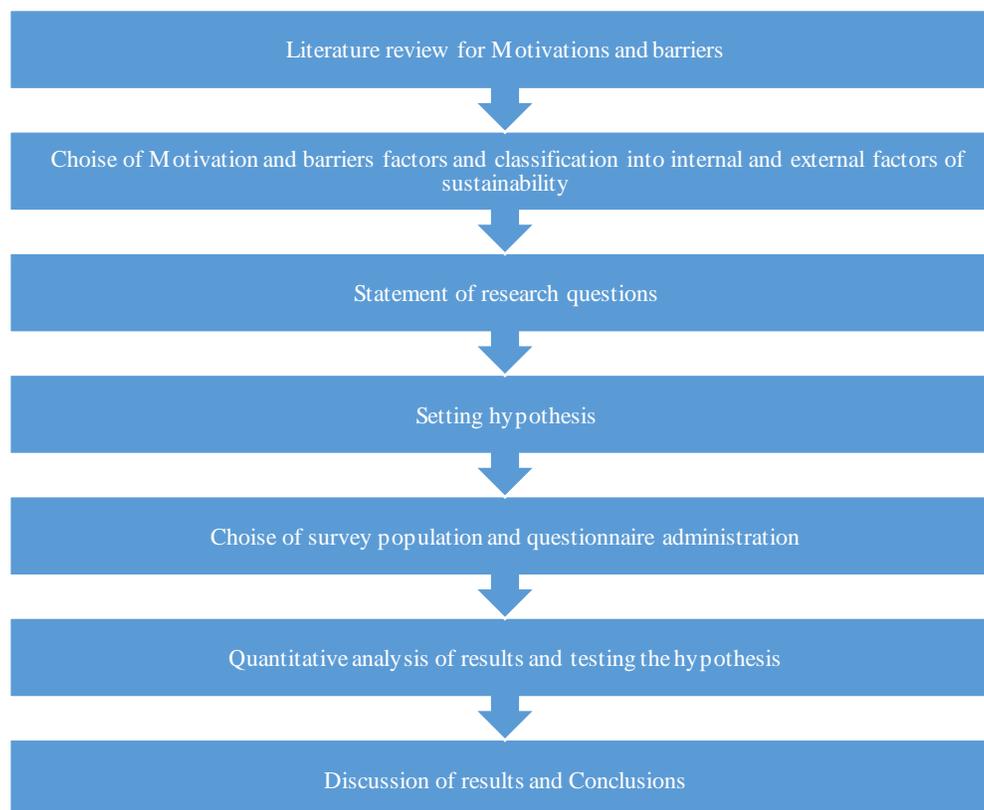


Figure.2. steps followed in the study.

3.1 Choice of adoption motivations

The choice of drivers and enablers for sustainability was made after reviewing the literature to depict only the important factors that figured more than once in articles as motivators to adopt a sustainable development strategy. These drivers for sustainability are usually classified into: Internal factors and external factors. The Internal motivation are related the company culture and top management policies. However, the external ones, are seen as pressure from the government, stakeholders or the customer for adopting sustainability as a strategy of differentiation.

Table 1. The adoption motivations

	Description of Motivation
Internal motivations	Top Management (Min, et al., 2001)
	Action of the parent company
	Firm orientation
	Good brand image (SAADE, et al., 2016)
	Organizational culture (Hughes, 2005)
External motivations	Pressure from stakeholders
	Regulation by the government (Tay, et al., 2015)
	Market entry (Marketing)
	Client demand (Hall, 2001)
	Compliance to international standards
	Challenge from competitors (Cooper, et al., 2000)

3.2 Choice of adoption barriers

The same methodology for choosing the drivers for sustainability was used to pick the barriers to investigate in the Moroccan context.

Table 2. The adoption barriers

	Description of Motivation
Internal barriers	Internal resistance to sustainability
	Uncertainty about the rate of return of benefits from sustainability
	Lack of resources (financial and human) (Min, et al., 2001)
	Lack of employees awareness of the importance of sustainability
	Lack of technological advancement for sustainability for distribution networks (SAADE, et al., 2016)
External barriers	Insufficient data and information about sustainability
	No government support for sustainability measures
	Lack of infrastructure for sustainable alternatives
	Lack of commitment of all the Supply chain members (SAADE, et al., 2016)

3.1 Research Questions and Hypothesis

The deductive aspect of our study allows us to set a priori research questions and hypothesis to validate after with a quantitative analysis. We conducted the survey over a sample of 30 Moroccan companies from different sectors in order to study and verify hypotheses established from the literature to determine the instigators and the barriers to achieve sustainability.

Our main research questions are stated below:

- **RQ1:** What are the main drivers for sustainability in the Moroccan industrial Context?
- **RQ2:** What are the main barriers for sustainability in the Moroccan industrial Context?

A set of hypothesis to be tested through the questionnaire is developed from the research questions:

- H1: The competitive advantage motivator Brand image is positively correlated with the adoption rate (level of sustainability) of sustainability for the companies of the study.
- H2: The external barriers are the most important factors that prevent the adoption of sustainability.
- H3: The sector of activity has a positive correlation with the level of sustainability in the Moroccan context.
- H4: ISO 14001 certified companies has a higher level of sustainability.

3.2 Research participants and the company characteristics

The survey population was not restricted to a particular region or an industrial sector. The Kompass database was used to identify a sample of companies to survey, the random sampling was used. Senior managers and top management were targeted since they are the ones that have a greater understanding of the company's strategy.

We administered the questionnaire through online surveys during a period of three months. Also we were led sometimes to administer the questionnaire over indirect interviews to avoid respondent bias. All questions were answered using a five-point Likert scale, i.e. 1 = very low, 2 = low, 3= moderate, 4 = high, 5 =very high.

At first, we send the questionnaire to 137 random company, picked from the Kompas database. After several reminders. After the end of the survey period, only 38 companies has returned the filled questionnaire, while checking the responses only 30 were usable (the rest of the responses were rejected, due to non-response for mandatory questions).

Table 3, present the respondent profile and the companies' characteristics surveyed in the study. In one hand, we can notice that most of the respondents are senior managers: **46%** have an experience superior to 10 years. In the others hand, the majority of the surveyed companies are in the automotive sector, we can argue that automotive companies are more involved in sustainable development and have stated that their distribution network has a high level of sustainability (Approximately **30%** of the companies that responded that the level of sustainability is above high are in the automotive industry).

Table.3. Research participant's and company characteristics

Research participant's and company characteristics					
Job position	CEO 7%	General director 14%	Logistics director 23%	Head of logistics department 56%	
Experience of the participant in the industrial sector	Less than 5 years 23%	6 to 10 years 33%	11 to 15 years 13%	More than 15 years 30%	
Industrial sector	Automotive industry 53%	Food Products & beverages (agri-food industry) 17%	Pharmaceutical industry 10%	Other 20%	
Number of employees in the company	Less than 100 13%	101 to 1000 50%	1001 to 5000 27%	More than 5000 10%	
Does the company have Environmental management certificate (ISO 14001)		Yes 53%		No 47%	
The level of sustainability of the distribution network according to the company	Very low 3%	Low 10%	Moderate 43%	High 33%	Very high 10%

4. Main Findings

SPSS (Statistical Package for Social Sciences) software for Windows version 20 which is the most widely used programs for statistical analysis, was used to analyze the collected data during this study. At first, we may use descriptive statistics to describe and summarize, but our goal is using inferential statistics to draw conclusions that goes beyond the firsthand data

- Testing hypothesis H1 (existence of correlation between the adoption (AR) rate of sustainability and the Brand image motivation (BI))

Since 26 out of 30 (87%) surveyed companies stat that the Brand image factor has either a high or very high importance, We try to test the existence of correlation between both variables, the adequate test for the analysis is the Pearson test of correlation. First, we recoded the modalities of answer (Very Low = 1, Low = 2, Moderate = 3, High = 4, Very High = 5).

Table.4. Correlation between the variables: BI and AR

		AR	BI
AR	Correlation de Pearson Sig. (bilateral)	1	,369*
	N	30	30
BI	Pearson's' Correlation de Sig. (bilateral)	,369*	1
	N	30	30

*. The correlation is significant at the (bilateral) level 0, 05.

The table above (table.4) shows that there is a relation between both variables (Correlation of Pearson=0,369 and $p=0,045$). The nature of the relation which binds both variables is positive and relatively low. Therefore, we accept the hypothesis H1.

- Testing hypothesis H2 (The external barriers are the most important factors that prevent the adoption of sustainability).

We try at this level to test which one of both types of barrier hinder the adoption of a strategy of sustainable development for the distribution networks (external Barriers and internal barriers). We afterward, calculated the average of the answers for every type of barriers, and made a comparison of the mean value via the T-student test.

Table.5. statistics of paired samples

		Mean	N	SD	Average SD
Pair 1	Mean_Barri_Intern	2,6533	30	,81695	,14915
	Mean_Barri_Extern	3,1333	30	,75607	,13804

According to the result of the calculation of the mean value, it seems that the external barriers hinder the adoption of a strategy of sustainable development for the distribution networks more than the internal barriers. This average difference has to be verified statistically to be able to confirm this result (Table.6).

Table below (table.6), shows that the Mean difference is equal to 0,480, the T-test confirms that this difference is significant statistically ($T=4,644$; $P\text{-value}=0,000$). We reject the hypothesis according to which there is no difference between the values of both Means in the population.

Table.6. Testing of the paired samples

	Paired differences					T	DDL	Sig. (bilateral)
	Mean	SD	Mean SD	Reliable interval of the difference in 95 %				
				Inferior	Superior			
Pair 1 Mean_Barri_Intern - Mean_Barri_Extern	-,48000	,56606	,10335	-,69137	-,26863	-4,644	29	,000

Therefore, we accept the hypothesis H2 that the external barriers are the ones that hinder the most the adoption of sustainability as a strategy in distribution networks.

- Testing hypothesis H3 (The industrial sector has a positive correlation with the level of sustainability in the Moroccan context)

The appropriate test for the analysis is the chi-square test. The Table.7 below shows that there is a relation between both variables ($\text{Chi-square}=26,738$ and $p=0,143$). Thus we can conclude that there is no relation between the Business

sector of the company and the degree of the durability of the distribution network. All the types of companies behaves in the same way in front of the adoption of the notion of durability of the distribution network.

Table.7. Chi-square Tests for hypothesis 3

	Value	DDL	asymptotic significance (bilateral)
Pearson's chi-square	26,738 ^a	20	,143
Similarityreport	25,599	20	,179
N valid observations	30		

a =28 cells (93, 3 %) have a theoretical size lower than 5. The minimum theoretical size is of, 03.

Conclusion for hypothesis 3: reject the hypothesis that the industrial sector affects the adoption rate of sustainability.

• Testing hypothesis H4: ISO 14001 certified companies has a higher level of sustainability

Here again we are testing if there is a correlation between the number of ISO 14001 certified companies and the adoption rate of sustainability. The appropriate test in chi-square test. The table 8 below presents the results. And shows that there is a relation between both variables (Chi-square=12,104 and p=0,017). Thus we can end that l has a relation between the degree of the durability of the distribution network and the ownership of an EMS ISO 14001.

Table.8. Chi-square Tests for hypothesis 4

	Value	DDL	asymptotic significance (bilateral)
Pearson's chi-square	12,104 ^a	4	,017
Similarityreport	14,366	4	,006
N valid observations	30		

b= 8 cells (80,0%) have a theoretical size lower than 5. The minimum theoretical size is ,33.

We detected the existence of relation between both variables, but it is necessary to measure it. Therefore, we used the Coefficient of contingency (see table 9 below). In our case, the coefficient of contingency is equal to 0.536 with p-value=0.017, which means that the variations of the variable degree of the durability of the distribution network is connected at the level of 53.6 % to the variations of the variable ownership of an EMS ISO 14000. It is a strong dependence.

Table.9. symmetric Measures

		Value	Approximate Significance
Nominal per	Phi	,635	,017
Nominal	V of Cramer	,635	,017
	Coefficient of contingency	,536	,017
N valid observation		30	

Conclusion for the Hypothesis H4: acceptance of the hypothesis according to which he exists relation between the degree of the durability of the distribution network and the ownership of an EMS ISO 14000.

4.1 Discussion and Implications

While everyone is enthusiastic about sustainability, and how it may change today's business practices. It seemed to us that identifying the major motivators and barriers, for sustainability related to the field of distribution in the Moroccan industrial context, was a challenge to take.

Based on the previous, the brand image (83%) and the client demand (76%) were the major motivators of sustainability for Moroccan companies. While the external barriers for sustainability were the ones that hinder the adoption of more sustainable measures in Distribution network. This comes from the fact that 66% of the companies surveyed in the

study think that the lack of infrastructure for sustainable alternatives is the major sustainability barrier. The second strong barrier was the lack of resources and experienced staff, we are encouraging firms to fund their employees training this can turn to be a major proof that the company is committed to sustainable development. Another recommendation is for the local authorities to invest in the optimization of the local infrastructures in order to make the transition to more sustainable strategies smoother.

5. Conclusion and future research

(Wan Ahmad, et al., 2016) State that companies' commitment and preparedness for sustainable practices, when it comes to their distribution networks, may elevate the implementation of SSCM strategies. In this paper we investigated the motivation and the barriers that most affect the sustainability of distribution networks. We exposed research questions, and tested hypothesis through a survey, using a questionnaire distributed to Moroccan industrial companies. This study, give us the opportunity to discover that Brand image and the client demand were the main instigators for sustainability. While the external barriers prevent more than the internal ones, the adoption of sustainable measures. However, several opportunities for future research are identified to improve our understanding such as:

- The use of a case study could also be conducted to distinguish the SSCM strategies that are adopted by Moroccan companies.
- Comparing the results obtaining from this paper with other research done in developed countries.
- Incorporating reverse logistics to Distribution networks and investigating
- Since this study was limited to 30 Moroccan company, in future work, we aim at including more companies and expand the industrial sector to include 3PL and 4PL.

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Biography

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