

## Study on the Impact of Smart and Innovative Delocalization Practices on International Trade

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**Article History:** Received: 11 January 2021; Accepted: 27 February 2021; Published online: 5 April 2021

**Abstract:** Faced with cumulative competition linked to the globalization of markets, and increasingly strong demands in terms of performance, many firms are led to ask the question of relocating either part or all of their activities. Relocation is a strategic decision which obliges companies to review and reconfigure their operations management methods, in particular those concerning the supply chain. The working objective is to identify the key factors to take into consideration for the design of the supply chain in the context of delocalization. First, we tackle the problem of defining delocalization and the supply chain. Next, we review the literature to define the specifics of the problem of relocation and their impact on international trade, notably the case of Morocco, and thus identify all the factors and constraints to be taken into account when reconfiguring the global supply chain in order to adapt it to the context of the practice of intelligent delocalization.

**Keywords:** Smart delocalization, International Trade, Industrial revolution, supply chain Engineering.

### 1. Introduction

The current economic context is characterized by increasingly volatile and unpredictable demand. As a result, the business environment has changed significantly and has become more complex and more difficult to predict than ever. Companies are facing multiple challenges, in particular shortening product life cycles, increasingly fierce competitive pressure, as well as new industrial and environmental constraints. In addition, these last decades have known a very strong technological evolution in particular in the field of information and communication technologies supporting the information system. These new information and communication technologies have enabled the emergence and development of new relationships within companies as well as between these companies. They have fostered a certain functional and technical integration necessary for the globalization of markets and the globalization of competition. To ensure their sustainability, firms are led to ask the question of a partial or total relocation of their activities.

### 2. Materials and Methods

#### International Supply Chain

**Table 1.** Summarizes the different definitions found in the literature that we consider the most relevant

Author	Definition
Lee et Billington, 93	The supply chain is a network of facilities that provides the supply of raw materials, the transformation of these raw materials into components and then into finished products, and the distribution of finished products to the customer.
Génin, 03	A supply chain is a network of organizations or functions geographically dispersed across several cooperating sites, to reduce costs and increase the speed of processes and activities between suppliers and customers. If the goal of customer satisfaction is the same, the complexity varies from one supply chain to another.
Fulconis et al, 2009	Transversal approach planning, implementing and controlling physical and information flows from the point of consumption to the point of origin

The supply chain has become of crucial importance in business management. It represents an operational link between the various activities of the company [1], ensuring the consistency and reliability of material flows, with a view to the quality of service to customers while allowing the optimization of resources and reduction of costs [2].

### The Smart Delocalization

Everyone understands intuitively that delocalization means transferring production from the national territory to other countries. However, the reality turns out to be more complex. Indeed, delocalization is often confused with other concepts (such as deindustrialization, outsourcing [3]).

Table 3 highlights a few definitions cited in the literature:

**Table 2.** Definitions of delocalization

Author	Definition
<b>Arthuis 05</b>	Delocalization brings together all the arbitrations carried out by companies against the location of activities and jobs in the country of origin.
<b>Aubert et sillard 05</b>	It is the substitution of foreign production by domestic production resulting from the arbitration of a producer who gives up producing in the country of origin to produce or subcontract abroad.
<b>Hammami 08</b>	Delocalization is the transfer by direct investment abroad of all or part of a productive process, the production of which is originally intended for the same markets as before, in order to maximize the added value of the activities of the firm.
<b>Kinkel et Maloca 09</b>	Delocalization of production capacity means relocation of this capacity abroad.

Bernard et al. distinguish three types delocalization: delocalization with cessation or reduction of activity in the country of origin, i.e. the transfer to a host country of all production or a link in the production chain of goods or services with cessation of activity and / or employment in the parent company [4], delocalization with global expansion of the activity: this is the start in a country reception of a production or a link in the production chain of goods or services similar to those of the country of origin without stopping or reducing activity and / or employment and delocalization with diversification of the activity: Establishment in a host country of a production of goods or services related or not to the productions of the parent company in the country of origin [5].

The current economic situation, characterized by fierce competition, shortages in energy and raw materials, the saturation of markets, informed customers, means that companies are in search of competitive advantages allowing them to stay ahead of their local [6], national and international competitors, to ensure their sustainability [7].

The competitive advantages sought essentially revolve around two major issues cited in Table 3:

**Table 3.** The causes of delocalization

Optimization of production costs	Selling on the local market
Benefit from a cheaper workforce	Getting closer to consumer markets
Overcome all the constraints of western countries	Overcome various obstacles to the export (quotas, customs taxes ...) of emerging countries
Benefit from advantages offered. Some LowCost countries offer additional services to companies setting up.	Free yourself from exchange rate variations

If the negative consequences for the countries undergoing delocalization are often put forward, we forget the positive consequences on the countries which benefit from these delocalization s. This is why, a complete understanding of the problem of delocalization[8], requires to see this phenomenon from two points of view, in the countries undergoing delocalization it is necessary that delocalization allows to increase the competitiveness of companies by lowering the costs of certain intermediate consumption, losing indirect jobs and redundancies, lowering the price of consumer goods, which favors the purchasing power of households[9]. While in the host countries: The consequences are often very positive for countries benefiting from outsourcing, in particular emerging countries [10]. They allow in particular to Create new jobs, by the transfer of production centers, Allow the transfer of know-how and techniques, often necessary for relocation to succeed, Gradually increase the standard of living of these countries[11].

### **3. Results and Discussion**

#### **Impact of Smart Delocalization on International Trade**

##### **The design of the international Supply chain:**

Efficient supply chain design and management enables the production and delivery of a variety of products at a low cost, of good quality and in times beyond competition [12]. Sink and al. sees that the design and management of the supply chain are aimed at obtaining the best overall performance so as to obtain better performance from each of the links in the chain [13].

Martel describes in a research work the problem of designing the supply chain as strategic, multi-criteria and complex [14].

The design of the supply chain plays the role of the determining factor of the success of the relocation. However, there are a number of aspects to take into account for the design and management of the supply chain which can be strategic, tactical or operational [15].

The choice of delocalization concerns the design of the supply chain and is one of the long-term management problems of the chain, i.e. deciding on the installations and the links between the installations. This results in localization / allocation problems in the supply chain.

##### **The Criteria Involved in the Delocalization Decision**

Since the beginning of the 1980s, many Western companies have chosen to relocate their factories or their supplies to countries with low labor costs in order to reduce their costs, in a verticalization approach; other companies, attracted by the importance of potential demand in emerging high-growth countries, are outsourcing in order to produce as close as possible to local markets, in a horizontalization strategy [16].

Analysis of the literature shows the existence of two approaches: the first, financial, emphasizes the profitability of investments, while the second deals with the strategic and managerial aspects of delocalization operations [17].

The financial approach makes it possible to estimate the profitability of an delocalization operation, while the risk management approach considers that the delocalization of production is based on opportunities but also on taking risks into account to avoid failure of the project [6].

##### **Design Models for the Production Line**

In this section, a literature review of mathematical models of supply chain design is proposed in order to identify trends in the literature and issues related to the design of the supply chain.

Lambiase proposes a classification of the mathematical models existing in the literature according to four axes: Strategic decisions, economic parameters, constraints and characteristics of the models [18].

According to a research work there is no literature where all the decisions involved in strategic planning and the design of the supply chain are taken into account [19].

It is based on the design aspects of the supply chain to discuss the existing models and see if they are adapted to the delocalization problem. It therefore focuses on models that include the decision to locate production and distribution sites because it represents the basis of the problem of delocalization.

##### **According to Decision Variables**

The Decisions cited in the following table are the most relevant in the context of offshoring. According to (Hammami 2008) models that integrate all of these aspects are rare.

**Table 4.** The Classification of models integrating decision variables

	1	2	3	4	5	6	7	8	9	10
<b>Location of sites</b>	√	√		√	√	√	√	√	√	√
<b>Choice of technologies</b>				√				√		
<b>Relocation of capacities</b>										
<b>Choice of suppliers</b>		√	√		√	√			√	√
<b>Intermediate products</b>		√		√			√			√
<b>Transfert price</b>			√				√			
<b>Transport cost allocation</b>		√					√			
<b>General expenses allowance</b>			√							
<b>Inventory management</b>				√						√

### According to Cost Factors

The costs are always included in the supply chain design models; a research work identified the costs relevant to the problem of delocalization. Apart from model 13, no model takes into account the cost of labor, so the costs of stocks in transit are rarely taken into account.

**Table 5.** The Classification of models according to the consideration of cost factors

	1	2	3	4	5	6	7	8	9	10
<b>Site closure</b>										
<b>Fixed supplier cost</b>		√	√						√	√
<b>Labor cost</b>										
<b>Fixed cost technologies</b>				√						
<b>Capacity cost</b>								√		
<b>Storage cost</b>				√		√				√
<b>Cost of stock in transit</b>				√						
<b>Site closure</b>										
<b>Fixed supplier cost</b>		√	√						√	√

### According to the Constraints

This table represents the constraints imposed by the delocalized environment, we note that the models which take into account the technological constraints - which are important in the case of delocalization - are very rare in the literature. The same applies to the constraints of local content[20].

**Table 6.** Models that take into Account Constraints

	1	2	3	4	5	6	7	8	9	10
<b>Technological constraints</b>										
<b>Supplier capacity</b>		√	√		√	√	√		√	√
<b>Local content</b>			√	√						

### Morocco: An Excellent Host Country for Delocalization and Offshoring

Morocco has entered the internationally recognized outsourcing destinations, particularly in the French-speaking world. Thus, the Morocco destination is systematically considered in the majority of Delocalization decisions and reference players have trusted Morocco.

Being aware of the challenges of offshoring and of the opportunities generated by this wave of globalization, Morocco has taken incentive measures to attract foreign direct investment (FDI), which is an engine of growth for the national economy.

The new investment attraction strategy adopted by Morocco as part of the "Industrial Emergence Plan" promises to be a kind of redefinition of Moroccan industrial policy. This redeployment is intended to be strategic in view of the competitiveness challenges that the country is faced with following the alarming findings of the country's economic situation, which is strongly linked to industrial structures[17].

## SWOT Analysis of the Industrial Sector in Morocco

We highlight in Table 7 the factors that make Morocco an attractive platform for the relocation of industrial firms as well as the weaknesses and threats that can slow down this relocation movement.

**Table 7.** SWOT analysis of the industrial sector in Morocco

<b>Strengths</b>	<b>Weak points</b>
<ul style="list-style-type: none"> <li>-Geographic proximity to Europe and timetable</li> <li>-Modernization of production tools</li> <li>-Flexibility to adapt to new markets</li> <li>-Standardization and quality approach</li> <li>-Quality and cost of labor</li> </ul>	<ul style="list-style-type: none"> <li>-Low importance to research and development</li> <li>-Difficulties in correctly using production tools</li> <li>-Technological delay</li> <li>-Delay in the transformation to globalization</li> </ul>
<b>Opportunities</b>	<b>Threat</b>
<ul style="list-style-type: none"> <li>-Willingness to delocalize European equipment manufacturers (Cost reduction)</li> <li>-Very smart customs dismantling</li> <li>-Creation of an automotive technical center</li> <li>-Upward trend in the national automobile market</li> </ul>	<ul style="list-style-type: none"> <li>-Inability to control unfair competition</li> <li>-Slow responsiveness to the demands of globalization and the free trade area</li> </ul>

## 4. Discussion

Our research work goes in the direction of strengthening the position of Morocco among the target countries of the relocation of large international companies.

Our contribution will take on a technical and engineering aspect, by proposing a mathematical model for the design and optimization of the supply chain in a delocalized environment. This model will be a decision-making tool for multinationals looking to relocate their activities to Morocco, and even for Moroccan companies that are studying investment opportunities outside the national territory.

After having identified the characteristics of the phenomenon of delocalization and based on how these characteristics impact the design of the supply chain, we are led to examine the models of the supply chain existing in the literature and see if these models are well suited to context of delocalization.

With this in mind, we have reviewed the analytical approaches to supply chain design as well as the classification of existing models according to well-defined axes of analysis. This classification allowed us to identify the model that best takes into account aspects of delocalization.

In perspective, we plan to verify and improve this model by adding relevant factors to take into consideration when designing the supply chain in the context of delocalization.

## 5. Conclusions

Delocalization leads to an increasingly complex industrial organization. It is therefore important to consider the company beyond its usual structure, taking overall account of its suppliers and customers.

The problem relates to the modeling of the logistics chain in the context of delocalization for optimized management.

In this work, we established a state of the art to understand the particularities of the phenomenon of delocalization and to define the parameters and factors to be taken into consideration in the development of an economic model of the international supply chain in the context of smart delocalization which will improve international trade better.

## References

1. Layti, M.B.M., El Imrani, O., Medouri, A., & Rajaa, M. (2019). Logistics Information Systems and Traceability of Pharmaceutical Products in Public Hospitals in Morocco: What Solutions to Improve the Supply Chain? In *International Conference on Advanced Intelligent Systems for Sustainable Development*, Springer, Cham, 429-438.

2. Hammami, R., & Frein, Y. (2014). Redesign of global supply chains with integration of transfer pricing: Mathematical modeling and managerial insights. *International Journal of Production Economics*, 158, 267-277.
3. Large, R.O., Kramer, N., & Hartmann, R.K. (2013). Procurement of logistics services and sustainable development in Europe: Fields of activity and empirical results. *Journal of Purchasing and Supply Management*, 19(3), 122-133.
4. Lambiase, A., Mastrocinque, E., Miranda, S., & Lambiase, A. (2013). Strategic planning and design of supply chains: A literature review. *International Journal of Engineering Business Management*, 5(Godište 2013), 5-49.
5. Chibisov, O.V., Chibisova, E.I., & Kazantseva, S.Y. (2017). Improvement of corporate operations in inventory management. *International Journal of Applied Business and Economic Research*, 15(8), 29-41.
6. PIPAME: Relocation of industrial activities in France: literature paper, 2013.
7. Bourekadi, S., E.L Imrani, O., Kandili, M.E.L., Slimani, K., Khouilji, S., & Babounia, A. (2020). Intelligent solution based on information technologies - The correct value of the business in economic organization is intangible asset, *Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019: Education Excellence and Innovation Management through Vision 2020*, 6310-6317.
8. Ogbo, A.I., & Ukpere, W.I. (2014). The impact of effective inventory control management on organisational performance: A study of 7up bottling company nile mile enugu, nigeria. *Mediterranean Journal of Social Sciences*, 5(10), 109-119.
9. Kinkel, S., & Maloca, S. (2010). Industrial locations: companies are rediscovering the virtues of made in Germany. Insights into the German economy. *CIRAC Economic Bulletin*, (95), 5-14.
10. Costa, D., Martins, M., Martins, S., Teixeira, E., Bastos, A., Cunha, A.R., & Machado, J. (2019). Performance evaluation of different mechanisms of production activity control in the context of Industry 4.0. In *International Conference of Mechatronics and Cyber-Mixmechatronics*, Springer, Cham, 85, 82-103.
11. Lemaire, J.P. (2010). Emerging countries: investors up against the wall. *The Expansion Management Review*, (2), 36-45.
12. Jayaraman, V., & Pirkul, H. (2001). Planning and coordination of production and distribution facilities for multiple commodities. *European journal of operational research*, 133(2), 394-408.
13. Chackelson, C., Errasti, A., Ciprés, D., & Lahoz, F. (2013). Evaluating order picking performance trade-offs by configuring main operating strategies in a retail distributor: A Design of Experiments approach. *International Journal of Production Research*, 51(20), 6097-6109.
14. Verter, V., & Dasci, A. (2002). The plant location and flexible technology acquisition problem. *European Journal of Operational Research*, 136(2), 366-382.
15. Sink, H.L., & Langley Jr, C.J. (1997). A managerial framework for the acquisition of third-party logistics services. *Journal of business logistics*, 18(2), 163-189.
16. Van Hoek, R.I. (2000). The purchasing and control of supplementary third-party logistics services. *Journal of Supply Chain Management*, 36(3), 14-26.
17. Darkow, I.L., Weidmann, M., & Lorentz, H. (2015). Adaptation of foreign logistics service providers' resources and capabilities to a new institutional environment. *Journal of Supply Chain Management*, 51(1), 27-51.
18. Kaddour, N.B., Rajaa, M., & Medouri, A. (2020). The Practices of Logistics Service Providers in Morocco: The Paradox of Collaboration/Coordination. *Acta Logistica*, 7(3), 167-174.
19. Bachár, M., & Makyšová, H. (2019). Evaluation of the impact of intelligent logistics elements on the efficiency of functioning internal logistics processes. *Acta Technológica*, 5(3), 55-58. <https://doi.org/10.22306/atec.v5i2.50>
20. Hrušecká, D., Pivnička, M., & Borges L.R. (2017). Logistics management as a system constraint. *Polish Journal of Management Studies*, 15(1), 76-87.
21. Sorooshian, S., & Panigrahi, S. (2020). Impacts of the 4th Industrial Revolution on Industries. *Walailak Journal of Science and Technology (WJST)*, 17(8), 903-915. <https://doi.org/10.48048/wjst.2020.7287>