

## INDUSTRIAL ENVIRONMENT SELECTION BY SOURCING STRATEGY IN THE CASE OF NORTH AFRICAN COUNTRIES

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**Abstract:** *As companies struggle to increase the number of customers, their strategic sourcing plays a vital role in the maintenance of their improving performance. The paper attempts to determine those macroeconomic factors (i.e. energy consumption, climate change, political stability etc.) for the international industrial companies that can contribute to the required quality and price of the goods produced in each examined countries. The indicators proposed are based on the World Bank's competitiveness and governance pillars. In this study, the valuation of the listed factors based on automated ICTs technology. The assembly of the Robotic Process Automation (RPA) system is concentrated not only to collect the current information it is needed to compare the relevant aspects of the selected indicators but can support decision making or forecast trends for suppliers. Results clearly indicate which countries are recommended for the investments or searching of potential suppliers. The findings of this study also should make an important contribution to the field of supply management to identify future trade routes.*

**Keywords:** *Procurement; Sourcing strategy; RPA system; Competitiveness pillars.*

**JEL Classification:** *C81; H57; O13.*

### 1. Introduction

As companies struggle to increase the number of customers, their purchasing and supply chain management (SCM) plays an important role in the maintenance of their improving performance. Investigating the supply and value chain is a continuing concern within the market competition in the case of industrial firms. The procurement management is able to translate corporate objectives into specific supply chain goals contributing to corporate strategy. However, these goals serve as a crucial driver for both strategic supply processes and detailed categories, such as specific action plans that are achieved through business relationships with suppliers (Monczka *et al.*, 2016).

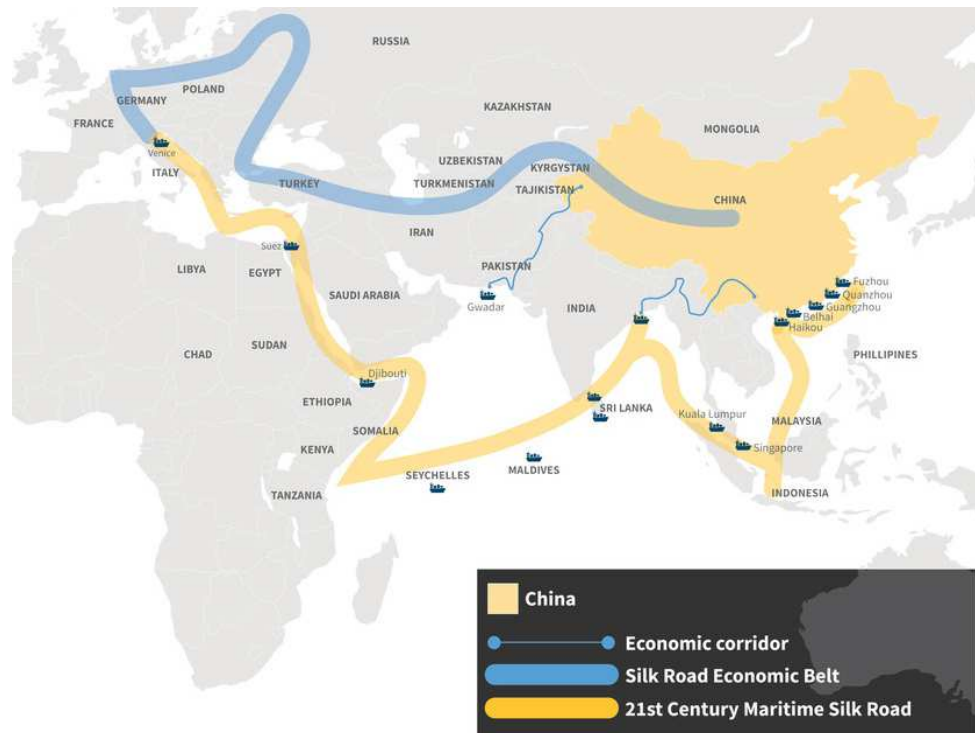
However, SCM is influenced by different disciplines, i.e. bits and items of industrial and systems engineering; supply, procurement and operations management; data technology, etc. The issue has grown in importance in light of recent effects of recent (ICTs) industrial revolution when dealing with the supplier's effort to implement total quality management principles, and its capacity to adapt changes in the customer's requirement, etc. (Bevilacqua and Petroni, 2002) flexibly.

In recent years, there has been an increasing interest in defining a corporate purchasing strategy is meeting quality, cost and delivery (QCD) requirements (Berk, 2010). QCD analysis as novel management approach originally developed to support firms within the British automobile sector is used to assess different components of the production process and provides feedback in the form of facts that aims managers to make logical decisions. If one of these three conditions is inconsistent with each other, then the level of customer satisfaction will be compromised. For instance, if the delivery costs are on an appropriate level, but the quality is not adequate as it is expected, then customer satisfaction can be violated (Tabor J, 2014). Thus, if the quality and price are accurate, but delivery delayed or not carried to the right address, it will have resulted in the loss of customer confidence. However, a major problem with this kind of application is to maintain this crucial balance, which should be a priority when developing a purchasing strategy (Nair, Jayaram and Das, 2015).

The majority of the European companies procure some of their raw materials and semi-finished products from Asia to obtain these goods at a more favourable price level than local commodity prices (Rosenau-Tornow *et al.*, 2009). The quality of products from the eastern supplier has already required more attention during the initial procurement period. Nevertheless, closer cooperation is also recommended to support the firms' requirements for the expected quality. The quality cannot be easily achieved and maintained by uprising suppliers. Consequently, delivery times may not be kept, because of a long sea shipping time, delivery risks which depend on the involved transport companies (Kovacs and Kot, 2016). In many cases, the schedule of the vessels is purely indicative and cannot be enforced extra costs and losses due to the delivery delays.

The findings of this study should make an important contribution to the field of strategic sourcing of supply management could be the 21st Century Maritime Silk Road (MSR) as the future trade route (Figure 1). In the long run, MSR as an economic corridor can be the sea route part of the new Belt and Road Initiative which is a Chinese strategic initiative to increase investment and foster collaboration across the historic Silk Road with the main goal of improving trade relationships in the region primarily through infrastructure investments (Bhattacharjee, 2015). One of the incentives is that improving Trans-Eurasian infrastructure could bolster global trade to the Europe-China economic corridor.

The paper attempts to determine those macroeconomic factors of strategic sourcing is one of the key processes for the international companies that can contribute to the required quality and price of the goods produced in each examined countries. The rest of this paper is divided into subsections. The next section gives a brief overview of the conceptual frameworks for selecting data criteria and the implied Robotic Process Automation (RPA) methodology. The third section presents the findings of this unique research. Finally, the paper ends with conclusions and implications stemming from the results.



**Figure 1:** China's New Silk Road (One Road One Belt)  
Source: authors' compilation based on Image of Lowy Institute

## 2. Determination of Data Selection and Implied Methodology

The vital base of business and strategic purchasing is public procurement. More attention that is recent has focused on the provision of procurement as having a strategic influence on the management of the public resources. However, it was mainly treated as a process-oriented 'back-office support function, often implemented by a non-professional staff of the procurement agencies (Zheng, Roehrich and Lewis, 2008).

Strategic sourcing is one of the crucial processes for companies to determine the quality and price of the products. Strategic decisions are also influenced by several local factors need to be taken into account. The indicators proposed in the study are based on the following factors of governance and competitiveness criteria (The World Bank, 2020), (The World Bank, 2019). All data in the analysis reflect on the last available status 2019 (Q1) before making any strategic purchasing decision. Criteria for selecting the subjects were as follows:

*Pre-selection criteria:*

1. **War (battle-related deaths):** the wage of war within a country or with other countries, it has a significant impact on the economy. Certain products may be subject to embargoes, export or import bans.
2. **Healthcare/Disease expenditures (% of GDP):** another competitiveness pillar of social and social security. The provision of healthcare and equipment is of paramount importance in the region. The question is what kind of care and prompt treatment a person can receive in the event of an epidemic or illness.
3. **Corruption index (%):** the extent to which acts of law or public morality in a particular country are significant. In exchange for money or other benefits, some individuals or companies gain unauthorized benefits, and market competition cannot be sustained.
4. **Child in employment (% of the population aged 7-14):** The International Labor Organization (ILO), which takes action against child labour, declares that goods produced in this form support the black economy.
5. **Existing Industry:** in a given country, there is already a company in the industry, it means that there is an experience in that industry with a workforce with the appropriate professional knowledge.

*Relevant location factors:*

6. **Political stability:** the index of Political Stability and Absence of Violence (Terrorism) measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means.
7. **Personnel costs (Compensation of employee):** the price level of the minimum wage or salary can have a significant impact on the production price of products in a given area.
8. **Social and emotional skills:** denotes social and cultural competence, rules of behaviour, work organization, gender equality, communication, tolerance.
9. **Foreign direct investments:** it is one of the most decisive signs of confidence on the part of an external operator, which may increase the willingness of foreign investors to invest.
10. **Economic growth (annual %):** expected gross domestic product market is crucial for forecasts.
11. **Education attainment:** the level of education in the area and the existence of industry-specific expertise.
12. **Population growth (%):** the rate is decisive for long-term labour supply and future demand of each country.
13. **Unemployment rates (%):** the number of unemployed in a given country, with data on age composition, education and, where necessary, retraining by profession.
14. **Living our values:** conduct the local, national standards that may apply to products, facilities, life, health, physical well-being and the human environment or workplace, technical requirements, tests, qualification criteria and definitions and specifications of services.

15. **Logistics performance:** index measures, i.e. the inland transportation (shipping) costs, warehousing costs, material handling and inventory costs.
16. **Logistics infrastructure:** index coordinates the organizational and technical tasks of transit in the knowledge of the relevant transport and connecting infrastructure at the time of sale of the goods so that the consignment reaches its destination in the fastest, safest and most economical way.
17. **Telecommunication infrastructure:** in the transportation industry, it is essential to have up-to-date information or even an online connection, which requires appropriate infrastructure and a high bandwidth internet connection.
18. **Real interest rates (%):** is the amount of interest payable for a specified period. If the supplier invests in new machines, it can be significant.
19. **Inflation index (%):** highlight the extent of the fiscal deterioration affects the predictability and equilibrium of the economy.
20. **Exchange rates and prices:** demonstrates the official currency of a country.
21. **Energy consumption:** essential to produce a given product are, i.e. electricity, water, gas, costs depend on the country's power plants and maybe from traditional, nuclear or even renewable sources, if not in sufficient quantities from external sources.
22. **Research and development (R&D) expenditures (% of GDP):** the presence of scientific research and development in a given place can have a significant favourable influence on the decision.

*Additional control factors:*

23. **Research and development (R&D) expenditures (% of GDP):** the presence of scientific research and development in a given place can have a significant favourable influence on the decision.
24. **Customs and other import duties:** imply a tax liability imposed by states on goods crossing their customs frontiers.
25. **Subsidies and other transfers:** are economic stimulus incentives that may have a positive impact on investment, financial or tax incentives, or in the case of greenfield investments, the handover of an area.
26. **Environmental pollution:** denotes the country-specific regulations, standards, industry emissions of pollutants, air, water and soil pollution. In a heavily polluted city, living conditions are also affected by environmental pollution.
27. **Tax revenues (% of GDP):** the amount of regular taxes and other contributions payable by the state or municipality vary from country to country and are governed by local law.

The next step of the analysis is to identify potential targeted countries. In order to minimize transportation costs, North African countries investigated. Namely, Algeria, Benin, Burkina Faso, Ivory Coast, Egypt, The Gambia, Ghana, Guinea, Guinea-Bissau, Cameroon, Cabo Verde, Chad, Liberia, Libya, Mali, Morocco, Mauritania,

Niger, Nigeria, Senegal, Sierra Leone, Sudan, Togo, and Tunisia. From the North African region, Ceuta and Melilla deliberately dropped out of the study. Ceuta and Melilla is an autonomous city of Spain, the governmental area of which is located on the Moroccan coast in North Africa, but from the scope of this study, it has no strategic or economic importance.

In this study, the valuation of the purchasing listed factors based on an automated ICTs technology that deals with the application of machines and computers to the production of goods and services (Lysenko, Shikov and Bochenina, 2019). The availability of technical capabilities for the aggregation of large amounts of data in corporate information systems leads to the possibility of constructing predictive models of supplier behaviour on the history of their activities (Huang and Vasarhelyi, 2019).

Robotic Process Automation (RPA) has been widely adopted in many industries, to automate well-defined and repetitive tasks. It can be used from automated supplier communication through the production area for order handling, control of maintenance and quality audit documentation, but can still be adopted in the financial and accounting area to allow strategic decision-making more informed (Struckov *et al.*, 2019). The assembly of the system is concentrated not only to collect the up-to-date information it is needed to compare the relevant aspects of the selected indicators but can support decision making or forecast trends for suppliers. Nowadays, not only industrial robots facilitate production, but also business processes can be executed with automated software solutions for repetitive, rule-based, administrative tasks. However, as ICTs advances, they will become more widely available and be combined with artificial intelligence to perform complex tasks (Naveen Reddy *et al.*, 2019). The different examined criteria and the potential automation of sources can be taught by an RPA System (UIPath), to collect data from a particular database and create sequences.

Hence, Robotic Process Automation (RPA) enables automating business processes using software robots. Software robots interpret, trigger responses, and communicate with other systems just as humans do. Robotic processes and intelligent automation tools can support businesses to improve the effectiveness of services with lower cost (Srikanth, 2018). RPA is a software equipped with artificial intelligence and capabilities of machine learning to handle high repeatable tasks that required to be performed by humans before.

### 3. Results of RPA System based on Selected Location Criteria

A case study approach was used to analyze each of the selected variables and allow justifying validity of results, concerning which countries can be considered as potential suppliers:

1. *Egypt* belongs to the so-called 'Next 11' countries, and will probably become some of the World's largest economies in the 21<sup>st</sup>. In this country, the proportion of private companies has increased significantly in recent years, that means investor confidence is growing. Automotive suppliers are already present in the country, in the manufacturing (automotive) industry direct

suppliers must meet stringent quality requirements. For instance, the International Automotive Task Force (IATF) No 16949, which is a global Quality Management System Standard for the industry. IATF incorporates the structure and requirements of the ISO 9001 TQM standard with additional automotive customer-specific requirements (Gruszka and Misztal, 2017). The major employers in the automotive industry are Daimler AG, Leoni, Kia and General Motors (GM); In 2018, Egypt ranked the 21<sup>st</sup> largest steel producing country with a production of 7.8 million tons.

2. *Algeria* has strong manufacturing perspective in the field of energy (oil and gas) processing and iron and steel industries. PSA concern (Citroen, Renault and Peugeot) already have assembly plants in Algeria and are currently planning to extend. Algeria has many diversified industries that contribute to meet local and import demands. Nevertheless, Algeria has become the second-largest car market in Africa (after South Africa) in recent years; The mechanical industry has existed in Algeria for a long time, with the state-owned company SNVI being the largest producer of buses and industrial vehicles in the African region (European Commission, 2020a).
3. *Tunisia* has been rising steadily for more than 20 years and is considered to be one of the most competitive countries in Africa. However, the crucial branch of industry is the textile and leather industry, mechanical and electrical engineering is becoming increasingly important. Thus, Tunisia is one of the European Union's most established trading partner in the Mediterranean region and ranks as the EU's 30<sup>th</sup> largest trading partner (European Commission, 2020b).
4. *Morocco* firmly focused on the internal market, but foreign markets are gaining importance and have a rising market for metal and plastics processing and motor vehicle construction. Morocco also has joined the OECD Vision for Education in Morocco 2015-2030 program to improve the education level (OECD, 2020).

Together these results provide important insights into these countries need to evolve with technological progress in order to be attractive to the investors. The forthcoming globalized (COVID-19) crisis is strongly influencing the corporate strategies within the sourcing strategy. However, it is sure that companies will work carefully with investments until they do not realize prosperity. Inside the companies, it is a basic expectation for the ICTs that continuously supports the progress of business activities (Marciniak, 2013). It means that those firms that are operating in the trade environment should become more international. There is constant pressure on collaborating projects via business progress or novel applications to improve the performance of industries (Sipos, 2019).

#### 4. Concluding remarks

In business, almost all processes take place much faster. The smallest time loss can also be the choice between success and failure. Nowadays the importance of information is speeding, supported by the Internet of Things (Nagy *et al.*, 2018), the

acquisition and speed of this information is not the only achievement is an excessive advantage for companies (Cygler and Sroka, 2017). Responding to specific segments of the industries, it needs to focus on developing digital knowledge in the examined region. For example, the critical barriers to the uptake of e-Procurement are unreliable supply, low level of awareness among people; and the lack of opportunity to exchange ideas, etc. (Kovacs and Kot, 2016).

The most interesting finding of the study was to identify those competitiveness and governance criteria of each North African countries on which industrial sectors related to investment/supplier perspective. Finally, a number of important limitations need to be considered. First, these factors can be reduced, expanded or weighted at any time. Thus, the empirical results are able to confirm a few features of strategic sourcing. Meanwhile, other elements, i.e. in the event of a severe epidemic, health considerations may be further expanded or be given more burden. Hence, the validity of conclusions is restricted by the omitted bias of data.

New investments will strengthen the economic stability of the North African region and may provide a solution to reduce the unemployment in the region, and as a result, the desire to reduce emigration pressure. It also generates marketable evidence in this perspective, if the living conditions of the people in the area improve. All this can be a long-term solution, as opposed to international assistance, which is not only a temporary result. The RPA results can facilitate not only strategic purchasing but also support future investment decisions. In this country-specific approach, further research could be fruitful in these directions. Additional latent indicators should also be taken into account related to the role of corporate governance, food security and sustainable development, etc.

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