

MESO STUDY SUMMARY: ARCHITECTURAL AND ENGINEERING ACTIVITIES AND RELATED TECHNICAL CONSULTANCY

In this section, we have used Porter's Diamond to analyze the sector 'Process management & Town and country planning', classified by the ISIC, Rev.4 of the United Nations as class 7110: 'Architectural and engineering activities and related technical consultancy'. The focus was on companies in the service sector of architectural and engineering activities both in Brazil and the Netherlands. For every determinant and variable of the Diamond, we compared both countries.

DEMAND CONDITIONS

The sector in both countries is either fairly stable or growing. The demand mostly originates from the government. Lack of space, population growth and high degree of urbanization give Dutch architects and engineers a key role in solving these problems. In Brazil however, most projects are set up to boost economic activity in certain districts. Brasilia is a good example of the latter.

We could say that the Brazilian Consumer Defense Code gets more in line with those of (western) developed countries. The higher standard and bundled set of rules provides a clearer guideline for the building sector, and thus should result into more quality (like safety, usefulness etc.). The Brazilian building code is better organized and pursued compared to other South American countries. However compared to the Netherlands we could say the Dutch regulations are still somewhat more widespread and controlled than the Brazilian Consumer Defense code.

The number of people working in the architectural and engineering sector in Brazil is much smaller than that of the Netherlands: In Brazil 39,000 people work in the sector, compared to 90,000 in the Netherlands. Therefore the relative amount of people working in this sector in the Netherlands is much bigger. There are about 137 Brazilian architectural and engineering companies, compared to the huge amount of 20,000 companies in the Netherlands. This means the size of an average architectural and engineering company in the Netherlands is much smaller than Brazil. This is because 92% of Dutch firms have less than 10 employees. However the turnover of Dutch companies is much bigger than that of the Brazilian sector: \$19.2 billion in the Netherlands versus \$2.76 billion in Brazil. This is one of the reasons that the Dutch architectural and engineering sector has a more important role in the economy of the Netherlands. This is also illustrated by the activities of Dutch firms abroad.

Both Brazil and the Netherlands have a couple of well known architects. The most famous examples are the Brazilian Oscar Niemeyer and the Dutchman Rem Koolhaas. Both Brazilian and Dutch architects are well known and respected for their designs. This can be seen in the fact that architects from both countries have won the very well known Pritzker prize (which is considered as the Nobel Prize of architects). Furthermore the demand for architects of both countries is considered to be relatively equal.

FACTOR CONDITIONS

In this determinant, some similarities and differences between Brazil and the Netherlands became clear. At first, because of the close relation with construction industry, geography and climate can indirectly influence the service sector.

Both countries require highly educated people for this sector. For both countries this is quite problematic; they face a shortage of properly educated engineers. In Brazil, this is because of structural problems in the educational system. In the Netherlands, this is because of the growing demand coupled with the aging of the population. Brazilian universities however, are of lower quality than the Dutch (technical) universities (while the latter are listed rather high in the world top 200 ranking, the Brazilian universities are not). In both countries, wages of engineers are relatively high, because of the shortage and the required high level of education. Dutch universities and consulting companies cooperate significantly more than Brazilian universities and consultancy companies do.

Globalization is getting increasingly important for the sector in both countries. However, there is a difference between them: a lot of investments in Brazil are in construction projects instead of the consultancy firms. This can be seen as potential for Brazilian construction firms as well as architecture and engineering companies. In contrary, investments in the Dutch sector are mainly in the architecture and

engineering companies themselves (the service providers), because of their specific knowledge and expertise. This is considered a main reason why they kept growing despite the worldwide economic crisis.

FIRM STRATEGY, STRUCTURE AND RIVALRY

In this determinant, the first difference between Brazilian and Dutch architectural and engineering firms is the fact that most of the Brazilian firms perform both in the construction and engineering sector together, while in the Netherlands many firms perform just in one sector (either engineering or construction).

The switch from the traditional contracts to integrated contracts is evolution in both countries. Especially in Brazil many contracts are still traditional. In The Netherlands many contracts are already integrated. These integrated contracts shift the risks partly to the contractor.

The competitiveness of the market plays is important for the innovative behavior of firms. Competitiveness forces firms to be innovative in both countries. Globalization becomes more and more important for the sector. For a firm to become a large player and to become more innovative, it must go abroad. Dutch firms are already doing this (as we saw in factor conditions), however Brazilian companies tend to focus more on the domestic market.

RELATED AND SUPPORTING INDUSTRIES

The architectural and engineering sector is closely related to the construction sector. Second, we found that in both countries companies are kind of clustered in areas where the most projects are. In Brazil, a lot of firms are in the south and north-east, in the Netherlands most firms are near the Randstad.

In contrast to The Netherlands, which has many engineering consultancy firms, Brazil has very few firms in the sector. Also, in Brazil they do not only do the engineering part, but also do the construction part. Because of this, in Brazil less interaction between the construction and engineering firms takes place. The knowledge of the employees stays within companies, which makes them hardly support each other.

There are similarities and differences in knowledge flow between The Netherlands and Brazil. In both countries there is a relative high employee transfer between firms. The difference is that the employees in Brazil that change their job are quite low-skilled. In The Netherlands job changers are partly high skilled employees. This result in knowledge flow between firm in The Netherlands and a lack of knowledge flow between firms in Brazil.

GOVERNMENT

The safety regulations for construction projects are relatively new in Brazil, while they are already present in the Netherlands for years. This puts a rather large burden on engineers and architects in both countries. Note that in the Netherlands, European Law is becoming more and more important.

Governments are the main client of the engineering firms in both the Netherlands and Brazil. Further, the Dutch government focuses more on sustainability, while in Brazil they are putting their effort on building quality.

CHANCE

For both countries, global warming is an issue. However, Brazil is focused more on their own economic development, while the Netherlands tries to mitigate the effects of global warming, by implementing sustainable solutions.

For Brazil, the two big sports tournaments can be seen as major opportunities for (economic) development. The Netherlands however, can rely on their stable economy but also have a possible big sports tournament that they are allowed to organize which can really bust their economy as well.

CONCLUSION

Some main differences are presented in table 1 below.

	Brazil	The Netherlands
Demand conditions		
Regulations	Less widespread and controlled	More widespread and controlled
Employees	39,000	90,000
Companies	137	20,000
Turnover	2.76 billion	19.2 billion
Factor conditions		
Reason of employee shortage	Problems in education system	Growing demand coupled with ageing of the population
Investments	More in construction projects	Mainly in architecture and engineering companies
Firm strategy, structure and rivalry		
Vertical integration	Both in construction and engineering sector	Mainly in construction sector
Contract	Mainly traditional	Mainly integrated
Market	Mainly operating in domestic market	Also many projects abroad
Related and supporting industries		
Interaction	Less, more firms performing in both construction & engineering sectors	Much, due to high amount of engineering firms
Knowledge flow	Less	Much
Government		
Building codes	Relatively new	Already present for years
Chance		
Focus	Economic development	Sustainability
	Brazil	The Netherlands
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Table 1: Comparative table

In terms of area and population, Brazil is much larger than the Netherlands. However, in terms of turnover, Dutch architects and engineers are much larger than Brazilian. This is seen in the demand conditions. The amount of companies and employees working in the sector is also much larger in the Netherlands.

The most important determinant of the Diamond is the 'Factor Conditions'. Both countries seem to deal with the same type of problems: both countries require highly educated employees and deal with a shortage of highly trained personnel in this sector.

A lot of foreign investments find their destination in Brazil. The country is still in development, which gives the country a lot of opportunities in construction: there's a lot of potential construction work to perform in the Brazilian domestic market. For example, the two big sports tournaments can be seen as major opportunities for (economic) development in Brazil. The Netherlands, in contrast, does not have that much construction work in the domestic market and is much further developed. This is reflected in the large amount of international activities of Dutch engineering firms and the demand for Dutch knowledge in for example water management.

We argue that this is enforced by the better educational system in the Netherlands and the problems in the Brazilian educational system, which is characterised by large gaps between secondary and tertiary education and universities overall have lower quality. Knowledge is the very core of the activities they perform (ONRI, 2005). In order for consulting engineers to carry out good advice and come up with good solutions for problems, they have to have a proper understanding of physical laws and key principles relevant to the projects. The quality of education determines the strength of the technical consultancy sector.

At last, sustainability is getting more important nowadays. Because Brazil is developing, sustainability is not (yet) the highest priority. However, this does not mean that it is not an issue yet, but in the Netherlands, it is considered a more important issue. Both government and companies try to deliver more sustainable projects.