Title:

Does it Make Financial Sense to Bring Manufacturing Back to Europe? A Case Study Illustration of a Strategic Investment Decision at a European SME.

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Abstract

There has been evidence in the last two years suggesting that many U.S. companies are bringing manufacturing back to the U.S. This growing trend is expected to boost the competitiveness of the U.S. economy and help it grow out of its debt. There is not much evidence to confirm if similar trends are starting in Europe. This paper attempts to present one such case of a European SME, which in 2011 made the strategic investment decision to switch from outsourced production in China to its own factory in Cyprus. While we focus in this paper on a holistic assessment of this capital project, we also strongly emphasize the financial appraisal process. We suggest a framework for scenario analysis since proper risk assessment is essential in such cases. Being able effectively identify financially viable capital projects will allow to channel government funding for supporting innovative SMEs with high growth potential, and thus will put the European economy on the path of recovery.

Keywords

Strategic investment decision making at SMEs, bringing manufacturing from China back to Europe, financial appraisal, capital budgeting, scenario analysis framework, economic growth versus austerity, overcoming European debt sovereign crisis
1. Introduction

Starting from 2011, there has been a very active discussion about western companies withdrawing their manufacturing from China and bringing it back home: US or Europe. The research undertaken in this area in the last two years has been based primarily on the data from American companies. Boston Consulting Group (BCG) has released a series of studies in this area [1, 2, 4] aiming to prove that manufacturing is returning back from China to US and that it truly signifies a major shift. BCG has argued for appropriate policy changes in such areas as taxes, regulation and R&D to support this hopeful trend, which promises to improve US competitiveness. Some researchers have strongly criticized the BCG reports, but many have agreed with the “direction” to which they point [5].

As Europe is currently looking for ways to boost its competitiveness as the best remedy to solve its financial problems, there is clearly a need for extensive research to investigate if similar trends take place in European companies and the extent to which such strategic moves are financially justified. All too often in the past the government support was given to capital projects, which were not financially viable in the long-term perspective, projects that relied solely on the artificial support and lacked growth potential. Such practice contributed to the accumulation of massive debt loads for a number of European governments, which in turn resulted in an unprecedented financial crisis for the whole Europe.

The aim of this paper, which is exploratory in its nature, is to present a real-life case study of a European SME, which two years ago made a strategic move of bringing its manufacturing back to Europe from China. In the authors’ opinion, this case serves as an interesting and helpful illustration to the abovementioned discussion topic. We use a financial management perspective in this paper to examine this strategic investment decision. We suggest a framework for financial appraisal with the focus on extensive scenario analysis.

The structure of the paper will be as follows. The research strategy and the research objectives are explained in part 2. A short review of the literature on the “Bring It All Back Home” topic follows in part 3, where we present the main arguments of economists and business practitioners on the issue of withdrawing the manufacturing from China and returning it back to U.S. or Europe. Part 4 introduces the case study as a useful real-life illustration to the topic. It is in turn split into several parts, starting from the company profile, then discussing the strategic investment decision process, the cost analysis, the financial modeling exercise framework, the scenario assumptions, and finally, presenting the financial appraisal results and the early post audit. The conclusions and recommendations are given in part 5.
2. Research Strategy and Research Objectives

The research strategy was defined by a combination of the reporting researcher and the business practitioner. The case study approach felt appropriate in this situation since so far there is very little research done in this area, especially regarding the involvement of small and medium-size enterprises. Case research was partly carried out real-time, and aimed to delineate the strategic investment decision process, with some variables and information tapped later from various sources. The assumption was that field research on actual practices would offer deeper and broader knowledge on this matter, while the application of the classical financial appraisal toolkit to this case would encourage a critical discussion of issues raised. A similar research strategy was used, for example, by Westerman (2006) when investigating the foreign direct investment of Dutch firms in Europe [6], or by Atik (2012) when discussing the strategic investment decision process for internationalization of SMEs in Turkey [8]. We have also followed some general guidelines for case research as per Yin (1994) [17].

The company presented in the case study is called ENGINO.NET. It is an export-oriented SME, founded in 2004 and based in Cyprus. The company has been investing heavily in R&D to develop a high-quality innovative product, and has been a recipient of the research funds and government subsidies. During 2007-2011 the company outsourced the manufacturing in China. At the end of 2011 the owner made the strategic decision of returning the manufacturing back to Europe.

Our intention in this case study is to investigate the reasons for this decision and then to focus on analyzing the financial side of this capital project to be able to answer the ultimate question of whether this strategic investment decision made financial sense. More specifically, our objectives are as follows:

- Clearly understand the motivation behind this strategic investment decision
- Investigate in detail all the stages of this capital project: from its initiation to the post audit
- Present the results of the factory cost estimation
- Develop the financial modeling exercise framework and apply suitable financial appraisal methods (NPV, IRR, Payback, Discounted Payback, Profitability Index) to assess the financial viability of this capital project
- Develop a framework for the scenario analysis, and comment on the risk dimension of this strategic investment decision as well as the need for funding support to this project
- Discuss the early post audit results (for 2012-2013)

As the final outcome of this paper we intend to make a small contribution to the ongoing debate on whether it makes sense for European companies to bring manufacturing back to Europe, which ultimately links to the debate on ways to boost competitiveness in Europe to overcome the current financial crisis.
3. “Bring It All Back Home”: Literature Review

In August 2011 the Boston Consulting Group published its first “Made in America” report [1], in which it concluded that China’s overwhelming manufacturing cost advantage over the U.S. is shrinking fast. Within five years, as the report said, “rising Chinese wages, higher U.S. productivity, a weaker dollar, and other factors will virtually close the cost gap between the U.S. and China for many goods consumed in North America” [1, p. 2]. The authors noted that the wages in China keep increasing at the rate of 15 to 20 percent annually, while the productivity growth rates are slower (around 10 percent per year). The ratio of average Chinese wages to average U.S. wages was 3 percent in 2000, 9 percent in 2010, and will reach 17 percent in 2015, according to the Report [1, p. 7]. Moreover, the cost of electricity has surged by 15 percent since 2010, industrial land in China is no longer cheap, and shipping rates are going up. The BCG recommendation was that companies should undertake a rigorous, product-by-product analysis of their global supply networks in order to carefully assess their total costs, rather than just factory wages. They went on saying that for many products sold in North America, the U.S. will become a more attractive manufacturing option. They also commented that for products that have high labor content and are destined for Asian markets, manufacturing in China will remain the best choice. “But China should no longer be treated as the default option”, the Report concluded in the end. Another concluding remark was that “China also will continue to be a major low-cost export base for Western Europe, even though the wage gap will narrow significantly... The change will probably not be enough to generate a tipping point, so Europe will continue to rely on China as a primary source of manufactured products five years from now” [1, p. 13].

The second BCG “Made in America” report came out in March 2012 [2]. Its main conclusions were that “seven groups of industries are nearing the point at which rising costs in China could prompt more companies to shift the manufacture of many goods consumed in the U.S. back to the U.S.” [2, p. 2]. The seven industries mentioned were transportation goods, computers and electronics, fabricated metals, machinery, plastics and rubber, appliances and electrical equipment, and furniture [2, p. 9]. This shift could create 2 to 3 million jobs, lower unemployment by 1.5 to 2 percentage points, and add around $100 billion in annual output to the U.S. economy. The authors urged companies to “think holistically”: to weigh not just their costs today, but also the economic trends influencing total future costs, plus take into account the projected productivity differences, the challenge of extended supply chains, and the high risk of cost volatility when considering their investments. From the list of companies which, according to the BCG report, recently pulled out of China, one example is of particular relevance to our own case study: “ET Water Systems, having made irrigation controls in Dalian, China, since 2002, relocated production and assembly to San Jose, California. Not only is it faster and cheaper to manufacture in San Jose, but the move has also improved quality and accelerated innovation and product development” [2, p.10].
In September 2012, BCG surveyed more than 5,000 consumers in the U.S., China, Germany, and France regarding their attitudes toward the value of the Made in USA brand and their actual buying behavior [3]. More than 80 percent of U.S. consumers and over 60 percent of Chinese consumers said that they were willing to pay more for products labeled “Made in USA” than for those labeled “Made in China.” In both the U.S. and China, respondents of all age groups and income levels expressed a concern for quality, a key driver of the consumer preference for U.S.-made products. 85 percent of U.S. consumers and 82 percent of Chinese said they "agree" or “strongly agree” that they feel better about Made in USA quality. Patriotism is another strong consideration among U.S. consumers: 93 percent said that they would pay more for U.S.-made goods in order to keep jobs in the U.S., and 80 percent said that buying U.S. products demonstrates patriotism. Patriotic moods are very strong in Europe too: more than 65 percent of consumers in both Germany and France said that they would be willing to pay more for products made in their home country than for those made in the U.S. or China.

Another survey by the BCG published in September 2013 [7] found that the share of U.S.-based executives actively engaged in the process of shifting production from China to U.S. has doubled since early 2012 and reached 54 percent (among 200 decision makers at companies across a broad range of industries). This survey result was interpreted by the BCG analysts as a “profound shift in attitude.” The top three factors cited as driving future decisions on production locations were labor costs (cited by 43 percent of respondents), proximity to customers (35 percent), and product quality (34 percent). More than 80 percent of respondents cited at least one of these reasons as a key factor. Other leading factors included access to skilled labor, transportation costs, supply-chain lead time, and ease of doing business.

The three annual BCG studies [1, 2, 4] and related surveys [3, 7] caused a heated discussion with many publications titled as “Bring It All Back Home”: some economists strongly disagreed [5], but many practitioners supported the Reports [9-11]. Most of the evidence of the “shift” has come however from U.S. companies, with only a few examples from companies in Europe [11]. The BCG analysts have cautiously concluded that Europe is a different story from the U.S. – yet our intention in this case study is to demonstrate the opposite. We believe that similar trends are beginning among European companies, even among SMEs, and that these trends need to be noticed and supported in appropriate ways by the European governments.

4. ENGINO.NET Case Study
   4.1. Company Profile

ENGINO.NET LTD was established in 2004 in order to commercialize a new system of multi-functional connectors invented by Mechanical engineer and D&D teacher Costas Sisamos. After 3
years of R&D the first sets of ENGINO construction toys were launched in Nuremberg Toy fair, getting the attention of global buyers and toy experts. Since then, new products are developed every year and now more than 50 different toy sets are offered, covering various age levels and price ranges. ENGINO is one of the very few toy products that originated directly from the educational system and can thus satisfy effectively the needs of both Retail and Education. The ENGINO TOY SYSTEM is the most versatile building system in the market today as it allows connectivity in all directions of the 3D space with the minimum number of parts. Children can build simple or complex models and learn by playing all about Technology and Science. Target customer group, besides schools of all levels, is children aging 5 to 14+ regardless of gender.

Since 2007, when the first products were launched in the market, the company experiences steady growth reaching now a presence in more than 15 countries. More than 300,000 ENGINO sets have been sold so far with a retail value of €10 million. The product received numerous local and international awards such as the Best Educational Toy by Dr. Toy in the USA, the innovation award by Cyprus Industrialist Association and Best Practice SME by European commission. The system has been granted several patents and registered industrial designs. The traditional toy market internationally grosses more than €60 billion per year and the particular category of building sets, where ENGINO is active, is the only one which shows an amazing 20% increase every year despite the world financial crisis.

In 2012, the company has invested in a new fully automated factory in Cyprus, successfully managing to minimize the product cost while controlling intellectual property and quality more effectively. In addition new ideas are expected to hit the market much faster. The company has incorporated complete vertical integration, from conception to tool making, manufacturing, packaging, exporting and direct retail through own concept stores. The company's success so far is impressive, especially having in mind that ENGINO started out in a small island such as Cyprus with no local market to support the first steps. Since no venture capital is present in Cyprus everything had to be self-financed through gradual research funds and sales income. After 9 years in the industry, ENGINO is now a proven concept and has managed to hold its stand not only against international toy giants like LEGO but also against new entrants and Chinese manufacturers. The next step for ENGINO is to become a global key player in the toy industry.

4.2. Moving Production to Cyprus: the Beginning

A major milestone of ENGINO history is the strategic decision to move the production back to Cyprus in 2012. The company has invested in buying new automated injection machines, packaging machines, CNC machines in order to be fully autonomous and better control the cost structure and
quality. A detailed analysis of this strategic decision, which will be given below, may prove useful for business owners, investors, researchers and policy makers.

It all started in June 2011 when the owner of the ENGINO.NET faced a very problematic situation with his production in China. The idea of establishing a European-based manufacturing had been in his mind since 2004 when he started ENGINO with the vision to “design and produce safe and innovative construction toys of the highest quality”. Yet due to limited financial resources the owner was forced initially to look outside Europe. In 2007 he started the production of his innovative construction toys by outsourcing via a Chinese subcontractor at a generic factory in Dongguan province, which is a developed area in China due to its close proximity to Hong Kong. At that time China seemed to be the right manufacturing destination offering affordable industrial rental rates, cheap manual labor and low electricity prices, while the Dongguan province provided good infrastructure.

After three years however, the Chinese subcontractor asked - instead of an expected annual rise of 5 percent – for a 60 percent increase in price, which the owner did not accept. So in 2010 ENGINO's production relocated to another Chinese subcontractor in the same province. In June 2011, the new subcontractor announced revised terms for the contract: a 30 percent increase in price for the plastic parts manufactured in the factory, a demand to get rid of all other suppliers of plastic parts and printed packages, a triple price for packaging, and finally, a 10 percent profit on top. The owner of ENGINO was not inclined to accept these new terms, and began searching for alternative solutions.

The constantly increasing costs of production in China were not the only concerns, but more like the “last drop in the glass”. Already for some time, the owner had been considering to move the production to Cyprus because he believed that it will:

- allow for a much better strategic fit with the company’s goals
- ensure higher quality of the product
- accelerate innovation and product development
- improve the perception of quality by consumers
- create a justified price premium since the product will have the “made in EU” label
- decrease the waste of resources
- secure a better cost control
- lower the future cost uncertainty

Yet, the level of current costs was the main consideration at the moment since the company had very limited financial resources, and therefore, the owner was not in the position to make the move if it was not financially justified. The owner was under the pressure to find a financially viable option, which at the same time would ensure the future growth.
4.3. Search for Alternatives: Own Factory versus Subcontracting?

The owner’s investigations clearly indicated that outsourcing/subcontracting, or in other words renting the production service, was an expensive choice everywhere, particularly in Europe. In countries like Germany or Cyprus, subcontracting would be about three times more expensive than in China, and in Greece it would be twice more expensive. Moreover, the prices of subcontractors, in other words the production costs for ENGINO (see Figure 1), varied considerably with no reasonable logic and no guarantees for the future. For example, one subcontractor quoted to the owner the machine cost per hour as €35 and another one as €11.

Figure 1. Cost Structure at ENGINO for Production Costs

This prompted the owner to start thinking “outside the box” and question the whole idea of outsourcing. What seemed as an obvious choice when he started his operations in 2007 needed to be re-considered. An alternative solution for ENGINO would be now to use its own factory instead of renting the production service from a subcontractor. Ideally, it would be best to invest in purchasing the land and the factory space, but it would require a major investment. An easier option – till the investors are found – would be to rent land and the factory space to establish ENGINO’s own production.
The owner felt that the machine cost per hour in the case of his own factory would be much lower than the prices quoted by subcontractors. Apart from the fact that he would not need to share profit margin with anyone else, the owner attributed the lower cost to such additional factors as using servomachines (i.e. machines which save electricity), a better technical match between the machines capacity and ENGINO’s tools, maximum automation.

4.4. Own Factory: China or Europe?

Once the owner decided to change strategy and switch from outsourcing to his own production, then the next question was about the factory location. Should the owner prefer China or Europe (Cyprus)?

A quick exchange of e-mails with some of the Chinese business contacts confirmed that in case ENGINO decides to establish its own factory in China, it needs a local partner. The owner initiated negotiations with one of his former suppliers, a Chinese printing house, trying to identify the terms on which ENGINO’s factory can be established in China and then comparing those terms to the Cyprus location. A number of legal, operational and HR-related issues surfaced, such as the requirement to provide dormitories and food for workers, the requirement to hire workers full time all year round, the difficulty in finding part time workers, the unfavorable trend for rental prices and electricity. The owner was dissatisfied with the general lack of flexibility which was important for a small enterprise like ENGINO. Those factors prompted the owner to look further into the cost analysis for the manufacturing in Cyprus.

4.5. Estimation of Factory Costs in Cyprus

Despite the fact that labor in Cyprus is very expensive, as everywhere in Europe, and additionally, Cyprus has the highest electricity cost in Europe, the owner hoped for reduced total costs in Cyprus versus China due to the full automation of his factory, the usage of servomachines and the lack of extra transportation costs, which he would normally pay in China.

The owner calculated the machine cost per hour for the two different types of injection machines that they were using. The results of this calculation were in line with his expectations. They are presented in Table 1 (see attached Excel Tables – Table 1) and in Table 2 (as a summary) below. The estimated average machine cost per hour ranged between €5.02 for the 24-hour shift and €7.98 for the 8-hour shift.
Table 2. Summary of the calculation of the Machine Cost per Hour for ENGINO in its own factory in Cyprus

<table>
<thead>
<tr>
<th></th>
<th>8 hour shift</th>
<th>14 hour shift</th>
<th>24 hour shift</th>
<th>11 hour shift</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total machine cost per hour</td>
<td>€7.56</td>
<td>€5.79</td>
<td>€4.77</td>
<td>€6.32</td>
</tr>
<tr>
<td>for the smaller-type machine</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total machine cost per hour</td>
<td>€8.41</td>
<td>€6.42</td>
<td>€5.27</td>
<td>€7.01</td>
</tr>
<tr>
<td>for the bigger-type machine</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average total machine cost per</td>
<td>€7.98</td>
<td>€6.10</td>
<td>€5.02</td>
<td>€6.67</td>
</tr>
<tr>
<td>hour</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As can be seen from Figure 2 below, the major cost drivers are electricity and labor (30% each). The estimation is based on the 11 hour shift, which is considered as probable worst case scenario.

Next step was to estimate the total costs in Cyprus and to compare them against the current level of the total costs in China. If there is an indication of reduced total costs in Cyprus, then the owner was prepared to commit to shifting manufacturing from China to Cyprus.

The factory costs for ENGINO, which mostly include variable costs and certain factory overheads, are as follows:

1. Production/processing costs (see a structure analysis in Figure 1)
2. Material costs (Figure 3)
3. Extra costs:
   a. For Cyprus: 8% extra for packaging (since manual labor is more expensive as compared to China)
   b. For China: 4.8% EU import tariff
The total factory costs in Cyprus were estimated to be lower than the current level of costs in China (the calculations are shown in Excel Tables: Table 3a for 11 hour shift, Table 3b for 8 hour shift, Table 3c for 14 hour shift, Table 3d for 24 hour shift, and Table 4 for the total differences in costs). ENGINO in its own factory in Cyprus may be able to improve its total factory costs by 4 to 19 percent (depending on the shift) – see the summary in Table 4a below. These results were viewed favorably by the owner since they meant an improved gross profit margin for ENGINO. The effect of the improvement in the GPM on future cash flows will be analyzed via the financial modeling exercise, which follows further below.

<table>
<thead>
<tr>
<th>Total costs, assuming:</th>
<th>Difference in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 hour shift (worst case but not probable scenario)</td>
<td>-4.0%</td>
</tr>
<tr>
<td>14 hour shift (currently used scenario)</td>
<td>-13.5%</td>
</tr>
<tr>
<td>24 hour shift (best operational scenario)</td>
<td>-19.0%</td>
</tr>
<tr>
<td>11 hour shift (worst case realistic scenario)</td>
<td>-10.6%</td>
</tr>
</tbody>
</table>

4.6. Financial Modeling Exercise Framework

A thorough financial appraisal of a capital project - using a variety of corporate finance methods as well as sensitivity and scenario analyses - has been proven as very helpful to business owners since such an appraisal provides more information on the decision to be done. It clearly projects the consequences of the present decisions into the future and allows to be better prepared for different possible scenarios. In developing our framework for the financial modeling exercise and
the investment appraisal for this case we have followed classical corporate finance textbook recommendations [12, 13, 15, 16, 18].

Two major options/projects will be compared and appraised:

- **Plan A**: ENGINO leaves the production in China continuing to outsource the production
  - For the next few years ENGINO will focus its financial and human resources on marketing efforts to promote ENGINO’s brand internationally. This will help ENGINO achieve higher sales growth rates. As per plan A, €100,000 will be invested in tools as initial investment in year 0. Tools are the property of ENGINO whether the production is in China or anywhere else.

- **Plan B**: ENGINO moves production to Cyprus switching strategy from outsourcing to a factory of its own
  - For the next few years ENGINO will focus its financial and human resources on production, which will be shifted to Cyprus. The main advantage of this plan is the ability to acquire full control of product quality, intellectual property and costs. ENGINO’s gross profit margin is expected to improve. Plan B requires higher initial investment as compared to Plan A. More specifically, Costas will need in year 0 to buy injection machinery €220,000, generators, tooling machines and some other €130,000, and spend €70,000 on tools (tools are less expensive as compared to Plan A because ENGINO will have tooling machines in its own factory). The total investment amount in year 0 is €420,000.

Plan A and plan B are treated as mutually exclusive. Plan A “Staying in China” is ENGINO’s default option, it is equivalent to the “firm without the project” option. Plan B “Moving to Cyprus” is a new option, i.e. it is equivalent to the “firm with the project” option.

Opportunity costs? We can think of the lack of resources for marketing/promotions in Plan B as an opportunity cost. Since the efforts will be focused on production mostly, it is reasonable to assume that the firm may underperform on sales growth as compared to Plan A, where the most effort is put in marketing/promotions.

Sunk costs? The R&D expenses are viewed as sunk costs and are NOT included into our analysis. They are financed from the government research funds and they will not affect the decision under consideration.

The financial modeling exercise for this capital project takes as a starting point the Income Statement for ENGINO for 2011 (see Table 5 below). For confidentiality reasons, the Sales amount is not the actual figure but a hypothetical one. The expenses and other costs are taken from real values and are extrapolated to correspond to the stated sales amount. This Income Statement is without the R&D expenses and government funding. The R&D expenses are treated as sunk costs and are excluded from our analysis.
The estimation of future free cash flows starts with building the projected Income Statement for the next 5 years. Both plans have been thoroughly checked to include realistic and yet relatively conservative assumptions about the future performance and the expected amounts of cash flows for years 1-5 (2012-2016).

### Table 5. Income Statement for ENGINO for 2011

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sales</strong></td>
<td>€</td>
<td>361,117.00</td>
</tr>
<tr>
<td><strong>Cost of goods sold</strong></td>
<td>€</td>
<td>198,611.00</td>
</tr>
<tr>
<td><strong>Gross Profit</strong></td>
<td>€</td>
<td>162,506.00</td>
</tr>
<tr>
<td><strong>Total Operating &amp; Administration Expenses</strong></td>
<td>€</td>
<td>119,160.00</td>
</tr>
<tr>
<td><strong>Operating Profit</strong></td>
<td>€</td>
<td>43,346.00</td>
</tr>
<tr>
<td><strong>Taxes</strong></td>
<td>€</td>
<td>2,814.00</td>
</tr>
<tr>
<td><strong>Net Profit after taxes</strong></td>
<td>€</td>
<td>40,532.00</td>
</tr>
</tbody>
</table>

Scenario analysis is a very helpful technique which reveals the weak areas of a project and allows developing of a better understanding of the risk dimension of a capital project [18, 20, 21].

Our main scenario, which we also call normal scenario here, assumes the 30% annual growth rate in sales for Plan A “Staying in China” and the 25% sales growth rate for Plan B “Moving to Cyprus”:

- **30% (China)** † higher than ENGINO’s previous performance, but realistic due to the expected increase in marketing promotions, which will bring brand awareness and will put ENGINO’s growth rates more in line with the industry trends (e.g. the 2010 sales growth rate in building sets in UK reached 45%),
- **25% (Cyprus)** † in line with historical annual growth rates at ENGINO (provided that 2-year averages are calculated to smoothen the irregularities in orders) and in line with moderate expectations of the company due to low brand recognition of their product so far.

We suggest a pessimistic scenario with lower annual sales growth rates, which may happen due to an overestimated effect of brand promotion activities or European recession trends affecting ENGINO’s exports, and an optimistic scenario with higher than expected growth in sales. To sum it up, our group of scenarios – as per Table 6 - consists of:

- Normal scenario for sales growth
- Pessimistic scenario: twice lower sales growth rates as compared to the normal scenario
- Optimistic scenario: twice higher sales growth rates as compared to the normal scenario

It is worth noting that the company’s production capacity with the projected equipment is up to €4 million turnover yearly.
The most important ingredient in the financial modeling exercise for this case is the level of the gross profit margin. For Plan A “Staying in China” we projected that the cost of goods sold will be at least 10 percent higher than the current level of costs, which brought us to an estimated gross profit margin of 40 percent.

For Plan B “Moving to Cyprus” we projected, in line with our cost estimations, that the cost of goods sold will be 10.6 percent lower than the current level of costs (we assumed the realistic worst case scenario of 11 hour shift), which brought us to the gross profit margin of 51 percent.

The main expected outcome of our financial planning model is to achieve a clear understanding of how the two different gross profit margins will affect the future cash flow projections – under the conditions of different sales growth rates for Plan A and Plan B - and in the end how financially viable these two plans look.

Other assumptions in building the projected financial statements are summarized in Table 7.

We use a variety of corporate finance appraisal methods, which will be summarized below in part 4.7, while in part 4.8 we will provide the logic behind choosing the appropriate discount rate.
Table 7. Other Assumptions for the financial modeling exercise for Plan A and Plan B

<table>
<thead>
<tr>
<th>1. Total operating expenses</th>
<th>Expected to be 35% of sales in years 1-2, 30% of sales in year 3 and the target for years 4-5 is 25% of sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Tax rate</td>
<td>10% of net profit before taxes</td>
</tr>
<tr>
<td>3. Net Working Capital (NWC) to sales</td>
<td>20%</td>
</tr>
</tbody>
</table>
| 4. Annual depreciation amount | China: €13,600  
Cyprus: €39,200  
These are calculated assuming 10 year depreciation period and 80% scrap value from the amounts of capex + €70,000 premises & equipment. |

4.7. Financial Appraisal Methods

For the purposes of investment appraisal we have used the following corporate finance methods in this case study:

- Net Present Value (NPV),
- Internal Rate of Return (IRR),
- Payback,
- Discounted Payback,
- Profitability Index (PI).

We will give below a very short description of each method used.

The Net Present Value (NPV) is found by subtracting a project’s initial investment from the present value of its cash inflows discounted at a rate equal to the firm’s cost of capital [13]. When NPV is positive, the investment is acceptable, also when there are alternatives with different NPVs, the alternative that has the highest NPV should be chosen [8, 13, 21].

The Internal rate of Return (IRR) is the rate that equals the present value of estimated cash inflows with the initial investment amount. In other words, IRR is the discount rate which makes NPV zero. Projects which have IRRs higher than their required rate of returns are acceptable. Additionally, IRR is the highest cost of financing of an investment [8, 21]. IRR is probably the most widely used sophisticated capital budgeting technique [13]. In other words, it is favored by large firms [8], while SMEs normally use less sophisticated techniques such as simple Payback.

The Payback period is the number of years in which the total cash inflows recover the initial cash investment. This is considered by some as a good method to see how quickly the initial investment amount will be collected [8]; however because it takes into account only liquidity but not the time value of money, it is highly criticized [18, 21]. The Discounted Payback is an improvement from the simple Payback since this method uses the time value of money techniques, but it still ignores the cash flows after the cut-off point.
The Profitability Index (PI) is found by dividing the present value of the future cash flows by the initial investment. It is useful when evaluating mutually exclusive projects of similar, but not equal size [18].

It is not the main aim of this case study to provide any proper comparison of how reliable or useful are the different methods of appraisal. Nevertheless we will comment on the usefulness of the methods that we have applied in this case since it may prove helpful for SME owners/managers.

4.8. Choosing the Discount Rate

One of the most challenging issues in this case was identifying ENGINO's cost of capital (=discount rate) for the purpose of calculating the net present value of the projects. We have attempted to apply the weighted average cost of capital approach (WACC) and the Capital Asset Pricing Model (CAPM), which - despite much recent criticism - remain to be the major models recommended by classical corporate finance textbooks, e.g. Ross et al. [15], pp. 418, 481, also [12, 13, 18, 25], and are widely used by practitioners.

The cost of capital is a weighted average of the after-tax cost of debt and cost of equity:

\[
WACC = \text{Proportion of debt} \times \text{Cost of debt} \times (1 - \text{tax rate}) + \text{Proportion of equity} \times \text{Cost of equity}
\]

This rate represents the opportunity cost for debt and equity holders for investing their funds in this particular business instead of equally risky investments [25], p. 235.

Regarding the proportions of debt and equity within the next 5 years for ENGINO (which is at the moment 100% equity financed), we have assumed that the market value of debt will be 15% of the total company value and the market value of equity will be 85%.

The tax rate in 2011 in Cyprus was 10%.

The cost of debt for ENGINO has been assumed as 9%, as per the data provided by the owner.

The cost of equity has been estimated using CAPM. The CAPM formula implies that in order to calculate the cost of equity we need to identify the risk free rate of return (normally, the rate earned on the government debt securities), the average market risk premium (i.e. the difference between the market return and the risk free rate), and the company's beta (the measure of sensitivity to systematic risk):

\[
r = r_f + (r_m - r_f) \times \beta
\]
Risk free rate?
According to the Cyprus Public Debt Management Annual Report 2011 [24], p. 22, “excluding the new long term loans which carry either relatively low fixed rates or indexed to floating rates with low margins, the weighted average interest rate of the 2011 security issuances was 4.26%”. We therefore assumed the risk free rate in our CAPM formula as:

\[ r_f = 4.26\% \]

Market return?
Normally, it would be logical to take the average return for the country’s stock exchange index, but the Cyprus Stock Exchange has been heavily dominated by banks (more than 85% of the total market capitalization). We have treated ENGINO as technology-based company, and therefore we have applied as market return in the CAPM formula the average market return of Nasdaq composite index for the last 15 years (see Table 8):

\[ r_m = 10.18\% \]

Beta for ENGINO?
Since ENGINO is not a public listed company, we are unable to directly calculate its beta using its historical prices. The same stands for LEGO, the main competitor of ENGINO¹. Of other toy companies, there are available betas [27] for:

Mattel (the biggest toy company in the world, mostly traditional toys like Barbie) \( \beta = 0.92 \)

Leap Frog (“the undisputed leader in children’s learning toys”², a relatively young and dynamically growing company) \( \beta = 2.14 \)

Taking into account that ENGINO is a new small company in the construction toys sector (the sector which has the highest growth rates within the toy market), it is much more risky and much more sensitive to changes in the market than Mattel. It can be compared to Leap Frog. We therefore have used a relatively high beta:

ENGINO \( \beta = 2 \)

With the inputs as listed above, the estimated cost of equity for ENGINO will be 16.10%:

\[
\begin{align*}
    r &= r_f + (r_m - r_f) \times \beta \\
    &= 4.26\% + (10.18\% - 4.26\%) \times 2 \\
    &= 16.10\%
\end{align*}
\]

¹ There is a paper which has estimated the beta for LEGO as 1.1 and the cost of equity for LEGO as 9.02% [26].
² [http://beta.fool.com/johnmacris/2013/01/22/toy-maker-should-leap-higher-2013/22221/](http://beta.fool.com/johnmacris/2013/01/22/toy-maker-should-leap-higher-2013/22221/) accessed on 02/06/2014
And the weighted average cost of capital will be approximately 15% (see also Table 9):

$$\text{WACC} = 15\% \times 9\% \times (1 - 0.1) + 85\% \times 16.10\% = 14.90\%$$

This is a relatively high discount rate, but in our opinion it is most appropriate in this case to account for high risk in both project A and project B.

Table 8. Average Market Return of Nasdaq Composite Index for the last 15 years

<table>
<thead>
<tr>
<th>Year</th>
<th>Meanings of index</th>
<th>Annual returns of index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>1291</td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td>1570</td>
<td>0.21611541</td>
</tr>
<tr>
<td>1998</td>
<td>2192</td>
<td>0.396178344</td>
</tr>
<tr>
<td>1999</td>
<td>4069</td>
<td>0.85629562</td>
</tr>
<tr>
<td>2000</td>
<td>2470</td>
<td>-0.392971246</td>
</tr>
<tr>
<td>2001</td>
<td>1950</td>
<td>-0.210526316</td>
</tr>
<tr>
<td>2002</td>
<td>1335</td>
<td>-0.315384615</td>
</tr>
<tr>
<td>2003</td>
<td>2003</td>
<td>0.500374532</td>
</tr>
<tr>
<td>2004</td>
<td>2175</td>
<td>0.085871193</td>
</tr>
<tr>
<td>2005</td>
<td>2205</td>
<td>0.013793103</td>
</tr>
<tr>
<td>2006</td>
<td>2415</td>
<td>0.095238095</td>
</tr>
<tr>
<td>2007</td>
<td>2652</td>
<td>0.098136646</td>
</tr>
<tr>
<td>2008</td>
<td>1577</td>
<td>-0.405354449</td>
</tr>
<tr>
<td>2009</td>
<td>2269</td>
<td>0.438807863</td>
</tr>
<tr>
<td>2010</td>
<td>2652</td>
<td>0.168796827</td>
</tr>
<tr>
<td>2011</td>
<td>2605</td>
<td>-0.017722474</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>0.101842978</td>
</tr>
</tbody>
</table>

Source: [http://finance.yahoo.com/q/hp?s=%5EIXIC+Historical+Prices](http://finance.yahoo.com/q/hp?s=%5EIXIC+Historical+Prices), date of access 01/05/2014

Table 9. Calculating the Cost of Capital for ENGINO

<table>
<thead>
<tr>
<th>Risk free rate</th>
<th>4.26%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of debt</td>
<td>9.0%</td>
</tr>
<tr>
<td>Tax rate</td>
<td>0.1</td>
</tr>
<tr>
<td>Proportion of debt</td>
<td>15%</td>
</tr>
<tr>
<td>Proportion of equity</td>
<td>85%</td>
</tr>
<tr>
<td>Market return (NASDAQ composite index)</td>
<td>10.18%</td>
</tr>
<tr>
<td>Beta</td>
<td>2</td>
</tr>
<tr>
<td>Cost of equity (CAPM)</td>
<td>16.10%</td>
</tr>
<tr>
<td>WACC</td>
<td>14.90%</td>
</tr>
</tbody>
</table>
4.9. Investment Appraisal Results

We have built the financial models in Microsoft Excel for projected free cash flows for ENGINO for years 1-5 of the project (2012-2016) as per assumptions outlined in part 4.6, and used the selected financial appraisal methods (presented in part 4.7) to evaluate the financial viability of ENGINO’s plans. As shown in Tables 10 and 11 in Excel Tables and in Figure 4 below, Plan B (Moving to Cyprus) requires higher initial investment (€492k versus €172k), but it provides higher cash flows in the future.

![Figure 4. Free Cash Flows for ENGINO: Normal Scenario China (30% sales growth) versus Normal Scenario Cyprus (25% sales growth)](image)

The net present value for the normal scenario of sales growth rates is slightly negative (-€5k) for both plan A (China) and Plan B (Cyprus): see Tables 12 and 13. The internal rate of return is above 14%, but less than the discount rate of 15% - which makes both NPVs somewhat negative. It would be reasonable to conclude that both normal scenarios (China and Cyprus) are approximately zero NPV projects for ENGINO. Their profitability indices are very close to 1. Both projects – under the normal scenario - are about the same in terms of investment returns and value generated.

<table>
<thead>
<tr>
<th>Table 12. Financial Appraisal for Normal Scenario China</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Present Value NPV</td>
</tr>
<tr>
<td>Internal Rate of Return IRR</td>
</tr>
<tr>
<td>Payback in full years</td>
</tr>
<tr>
<td>Discounted payback</td>
</tr>
<tr>
<td>Profitability Index</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 13. Financial Appraisal for Normal Scenario Cyprus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Present Value NPV</td>
</tr>
<tr>
<td>Internal Rate of Return IRR</td>
</tr>
<tr>
<td>Payback in full years</td>
</tr>
<tr>
<td>Discounted payback</td>
</tr>
<tr>
<td>Profitability Index</td>
</tr>
</tbody>
</table>
The difference between the two projects is visible however in Figure 5, which shows how the abovementioned NPVs (normal scenario China versus normal scenario Cyprus) behave under different assumptions of the cost of capital. We can clearly see that under the assumptions of a lower discount rate the Cyprus project looks financially more attractive since it provides a considerably higher NPV than China project. If on the other hand we apply a higher discount rate, the Cyprus project becomes less attractive since its discounted future cash flows are too small to compensate for the required initial investment.

The investment appraisal results for the pessimistic scenario (as per Tables 14-17 from ENGINO Excel Tables) and the optimistic scenario (as per Tables 18-21 from ENGINO Excel Tables) are summarized in Table 22 below, which reveals that the Cyprus project presents higher risk. In case of slow growth in sales, such as 15% annual growth for China and 12.5% for Cyprus, the Cyprus project will end up with the negative NPV of €83k, four times bigger the negative NPV of the China project. However, in case of high sales growth, i.e. 60% annual growth for China and 50% for Cyprus, the Cyprus project creates substantial positive NPV: €219k versus only €20k in the China project.

Figures 6 and 7 provide an additional helpful illustration for managers/owners to properly understand the risk dimensions of the two projects and the consequences of each of the projected scenarios. In this particular case, the scenario analysis has clearly revealed that ENGINO needs to look very carefully into the probability of the pessimistic scenario. If the company decides to proceed with the project, it needs to focus maximum possible effort on achieving high growth rates in sales already in the nearest future because this is an imperative for the Cyprus project to succeed.
<table>
<thead>
<tr>
<th>Types of scenarios</th>
<th>Plan A: staying in China</th>
<th>Plan B: moving to Cyprus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pessimistic scenario</td>
<td>€ (19,342.21)</td>
<td>€ (82,967.52)</td>
</tr>
<tr>
<td></td>
<td>11.24%</td>
<td>8.48%</td>
</tr>
<tr>
<td>Normal scenario</td>
<td>€ (5,036.41)</td>
<td>€ (5,470.81)</td>
</tr>
<tr>
<td></td>
<td>14.14%</td>
<td>14.61%</td>
</tr>
<tr>
<td>Optimistic scenario</td>
<td>€ 21,760.11</td>
<td>€ 218,622.03</td>
</tr>
<tr>
<td></td>
<td>17.94%</td>
<td>27.46%</td>
</tr>
</tbody>
</table>

Considering that the China project does NOT generate a particularly high NPV even under the optimistic scenario (60% annual sales growth), the owner made the decision to take the risk and proceed with moving the production to Cyprus.
Commenting on the usefulness of the different appraisal methods, it is worth noting that the classical NPV rule proved to be the best guidance, just as many researchers recommend [14, 18, 21, 25], since it directly measures how much value is created. By choosing Plan B “Moving to Cyprus” the company will be able to create substantial additional value.

At this point it is important to remember that our financial appraisal has been based on the crucial assumption that ENGINO continues to fund its R&D expenses via the government/EU research funding. Our analysis has shown that the owner is making the right strategic decision by moving the production from China to Cyprus, but he certainly needs R&D funding support to be able to develop further his products to stay competitive in the highly dynamic industry of construction toys. In our opinion, this case is an excellent illustration of a type of SME, which is a worthy recipient of research funds and government subsidies since such investments by the local governments or EU will generate high returns in the future and will help the European economy to gain its competitiveness. The scenario analysis framework, which we have suggested in this paper and which has been tested out via this case, is a very simple yet useful tool for SME owners/managers and policy makers.

4.10. Early Post Audit

Two years passed since the end of 2011 when the owner of ENGINO made his strategic decision to shift the manufacturing from China to Cyprus. As the owner recalls, that decision was hard to make since it implied taking considerable risks. How has it turned out so far?

From the operational side, the owner is overall satisfied - feeling that his expectations from the move (as we summarized in part 4.2) have been realized more or less as he planned. It is really important for him that ENGINO.NET LTD is now a "complete" company covering R&D, tool making, manufacturing, sales and distribution, all under the full control of the owner.

From the financial side, the preliminary results look good despite the fact that the economic climate in Cyprus has been deteriorating in 2012 and particularly in 2013 when Cyprus was hit by the banking crisis. ENGINO’s preliminary financial results for the last two years - 2012 and 2013 (estimate as of November 2013) – have improved dramatically. The company managed to decrease manufacturing costs as compared to the 2011 level in China by around 15 percent. The ratio of costs to sales is now substantially lower: 37 percent in 2012 and 40 percent in 2013 versus 55 percent in 2010-2011. Figure 8 shows the ratio of costs to sales for ENGINO during 2007-2013.

As a result, the gross profit margin is now substantially higher: 63 percent in 2012 and 60 percent in 2013 versus 45 percent in 2010-2011. The company also managed to increase the operating profit margin and the net profit margin in a most impressive way, as can be seen from Figure 9, which shows the profit margins for ENGINO during 2007-2013. The operating profit margin in 2011
was 6 percent, and by 2013 it jumped to 43 percent; while the net profit margin went from 4 percent in 2011 to 36 percent in 2013. This became possible due to the exceptionally high sales growth rates achieved in 2012 and 2013, which have been well above the projected optimistic scenario rate of 50% annual growth (see Figure 10). Since most of the company’s operating expenses are fixed, their proportion in sales revenue shrank considerably. In fact, it shrank much more than ever expected due to the fact that the owner was extremely concerned with improving profitability and took exceptional measures to cut out all unproductive costs, and thus the operating profit margin has increased substantially.

![Figure 8. Cost of goods/Sales Ratio of ENGINO in 2007-2013](image)

![Figure 9. Profit Margins of ENGINO for 2007-2013](image)
5. Conclusions and Recommendations

Researchers in the past wrote that strategic investment decisions have substantial effects on the long-term financial and operational performance of companies [19], and have a big impact on the competitive advantage of firms [20]. ENGINO’s case presented and analyzed in this paper is certainly a perfect illustration to these statements. When the company’s owner made in 2011 the decision to withdraw his production from China and bring it to his home country, Cyprus, his main motivation had to do with gaining long-term competitive advantage for his company via improving operational performance through cost, quality and intellectual property control. The motivation to secure financial viability was his other consideration, and the imperative condition for his decision was that it should provide a good fit with the company’s not only strategic, but also financial goals. Previous researchers commented that the literature of the last two decades on strategic investment decision-making has re-oriented from a purely financial appraisal approach to a more holistic approach which is focused on strategic issues [8, 20]. While there is no argument that this is the right approach and we have illustrated it via this case study, it is also worth noting that it makes sense to place considerable emphasis on projects’ long-term financial viability when evaluating projects by SMEs which involve government funding. The government’s role should be of strong support to capital projects of SMEs which have potential to create value in the economy. Unlike large companies, SMEs need such support, and there should be a clear framework how to identify such projects and a defined policy for appropriate support.
As we showed in the brief literature review in part 3, there is strong evidence from U.S. companies indicating that the process of returning manufacturing back home from China has massively accelerated in the last two years, and by now it clearly represents a profound change. The BCG analysts strongly argue that China is no longer the default manufacturing option for US companies due to such key factors as quickly rising labor costs, a surge in electricity prices, escalating industrial rents, growing shipping costs. Many economists and practitioners have agreed, but some argued against, and the discussion is still in its peak.

So far there has been very little evidence on this issue from European companies. The BCG analysts in fact concluded that Europe is a different story from U.S. and that European firms will continue to think of China as the default production option for at least five more years. The case of ENGINO which we have presented in this paper provides evidence to the opposite. This European SME moved out of China two years ago for reasons very similar as the ones listed in the BCG reports for U.S. companies. It was a remarkably brave strategic move. Against many odds, the decision has already brought positive results proving that innovation and manufacturing have place in Cyprus.

Our thorough investigation of the financial management side of this strategic decision - as the intended focus for this paper - brought us to the following conclusions:

- The escalating costs in China forced the owner to search for alternatives, and when alternatives for cheap renting of the production function were not found in Europe, the owner was prompted to re-consider his strategy and switch from subcontracting to his own factory.
- The SME owner preferred the Cyprus location for the factory versus China due to a number of legal, operational and HR related issues.
- Cost estimation undertaken by the owner revealed that the total factory costs in Cyprus are likely to be 11 to 14 percent lower than in China, and this estimation proved to be correct.
- The achieved cost advantage allowed the company to improve its gross profit margin.
- A detailed financial appraisal using a variety of corporate finance methods revealed that the Cyprus project has clear advantages over continuing the production in China, and it will create value for the company and for the economy. The NPV method has proved as most useful in this case, especially for deciding on mutually exclusive projects. NPV is reliable because it directly measures how much wealth is created.
- The scenario analysis has been a simple yet useful tool to understand the risk dimension of this decision. It has given helpful warning signals regarding certain scenarios which should be avoided. We can conclude that scenario analysis is a very helpful technique for SME owners who have to deal with a project’s risk assessment, and should be widely used.

Answering the question which we posed in the title of this paper, we can say that ENGINO’s case study proves that for some firms it certainly makes financial sense to bring manufacturing back to
Europe from China. Moreover, the financial goals in this case have become perfectly aligned with the firm's strategy: the owner strongly commented on the accelerated innovation and product development as one of the key realized advantages of the move to Cyprus.

Our conclusion is that ENGINO’s case is an illustration of a type of SME, which is a worthy recipient of government funds. Such investments will generate high returns in the future and will create value for European firms, thus helping the European economy to recover from the crisis. The problem of the massive debt load, which caused the current European financial crisis, is best solved via the economy growth rather than by austerity measures, which have had a limited effect so far [22, 23].

We fully realize the limitations of this study since it is based on one case only, and a deeper and broader research in this area is needed to be able to arrive at any meaningful conclusions.

References


Supporting Engino Excel Tables are attached as separate files.