THE BUILD-TO-ORDER TRANSFORMATION

An Analysis of the Financial Impacts of Build-To-Order Practices in the Automobile and Computer Industries

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ABSTRACT

Starting with success of Dell Inc. in the early 90s, Build-To-Order has become interesting for many companies and industries. Similar to Total Quality Management or Six Sigma it has often been used as a panacea for many problems. But until now there has been no comprehensive analysis of the financial impacts of Build-To-Order. This paper will analyze the impact of Build-To-Order transformations on three carefully chosen financial performance variables. A case analysis was conducted on companies in the computer and automobile industries. The computer industry serves as precedence and proof for the measurability of Build-To-Order transformations for one of the financial measures. With this evidence, the effect and success of Build-To-Order transformations in the automobile industry is analyzed on the basis of eight cases.

1. Introduction

What is Build-To-Order?

Generally speaking, Build-To-Order is nothing sophisticated or very new. For long time it has been employed for high end, highly specialized and low volume products. It would be surprising to find a Ferrari, for example, that is not built to customer order.

The core strategy of Build-To-Order is to produce each good based on the likes and requirements of each customer individually. This means for production and supply chain, that there is no action until a customer order comes in and triggers the production process for one specific product assigned to the customer.

This in fact sounds very simple, but it means huge problems especially for industries, which mass produce and need economies of scale to be productive. The automobile industry is a very good example, since expensive machines require high capacity utilization to be profitable. For such equipment it would be best to produce only one standardized product to avoid long, productivity destroying changeover times. In the past, for such industries it was unquestioned, that the only correct way to run the business would be to forecast demand and schedule production according to that forecast. Doing this would enable the company to optimize the production sequence to achieve maximum productivity.

The Meaning of Build-To-Order Transformation

Supported by the IT revolution in the early 90s, Build-To-Order received new attention and companies, which used to plan their production to demand forecasts, started to consider this strategy even for mass produced goods. Dell Inc. triggered the Build-To Order popularity through its direct sales concept and is considered as the prime example for successful Build-To-Order adoption.

But at the same time there were many other companies, who encountered huge problems in transforming towards Build-To-Order and Mass Customization strategies, because drastic changes were required for that transition. Transforming from Build-To-Forecast to Build-To-Order requires an overall change of corporate structure and organization. Most crucial is the flow of information within the company and among supply chain partners, since in a Build-To-Order company the customer order triggers the whole operational process. The most difficult part adopting a Build-To-Order operation is to reduce order lead time, since customers of mass products usually do not want to wait long for their order to be delivered.

Since the internet has evolved so rapidly, to reach the customer and enable him to place an individual order is not the largest problem anymore. The challenge is to process and physically carry this order all through the supply chain fast and cheap.

When Build-To-Order Makes Sense

Build-To-Order definitely is not the right strategy for every product. Since the transition to a customer-driven production process is fundamental and requires large investments, it is necessary to really evaluate and analyze the possible improvements and savings generated by Build-To-Order.

The transformation to Build-To-Order can improve efficiencies and performance especially in areas where Build-To-Forecast has its major deficiencies. Product characteristics, which make forecasting extremely difficult and expensive, are mainly: high demand variability, large number of variants, short product life cycles, high inventory holding costs, etc.

Perhaps the most important production characteristic required to justify a Build-To-Order implementation, is a short lead time between an order placement and its delivery to the customer. To accomplish this, companies have been most creative in reducing response time and increasing production flexibility.

2. Industry Selection

The computer industry was the initiator of moving from Build-To-Stock to Build-To-Order. Impressed by Dell’s Build-To-Order performance companies like Hewlett Packard, IBM, Apple and Compaq started to work on Build-To-Order implementations as well and developed their own interpretation of a Build-To-Order production process. After successful Build-To-Order transformations of computer manufacturers in the mid 90s, the automobile industry was the next group to embark on the Build-To-Order

bandwagon. BMW and Mercedes Benz were among the first automobile manufacturers, which defined the Build-To-Order philosophy as the next step for more competitiveness and profitability in the future.

Since those two industries were most aggressive and ambitious in implementing the new customer oriented approach, first results and impacts on financial measures are most likely to be found here, which is why those two industries were chosen for a first financial case-to-case analysis in this paper. The main focus, though, lies in analyzing financial impacts of Build-To-Order transformations within the car industry. The computer industry serves as a benchmark and provides evidence of the ability to observe Build-To-Order impacts on financial performance.

Moreover, the differences in requirements for computer and car manufacturing provide a better understanding of the critical elements in a transformation to Build-To-Order. Problems as well as mistakes in implementing this new approach to the customer will become clearer through comparing cases among across both industries. Best practices can then be developed and used for further improvements.

3. Build-To-Order Objectives and Goals:

As an initial analysis of the impacts of Build-To-Order transformations this paper focuses on specific measures, which are supposed to indicate most clearly any impacts of strategic change. The intention is to provide clear evidence of the effectiveness of the transformation in helping companies to reach the major objectives they prompted transformation. In other words, did the Build-To-Order transformation really meet expectations in terms of increased efficiency increase and reduced costs, or were the results negligible?

The following objectives are the major incentives companies look at when thinking of a Build-To-Order transformation:

Reduction of Inventory

Forecasts are always wrong! To buffer mistakes in forecasting companies carry a lot of inventory in their warehouses and in their production pipelines, tying up a lot of capital. If it would be possible to be independent from forecasts just by reacting fast on actual demand, inventory would become obsolete. Considering that GM, for example, has about $40 billion tied up in inventories, the attractiveness of getting rid of inventory through Build-To-Order becomes clear.

Increase of Profit Margin and Revenue

For products that are exactly what the customer wants, companies can charge more than for products that were designed to attract as many people as possible, but do not match the preferences of particular individuals. This logic generates a problem especially in computer and automobile companies. New cars are often discounted multiple times before they leave the retailers lot, just because they were not exactly what the customer

wanted. With customized products, the car industry hopes to decrease discounting and sustain prices at higher levels.

Reduction of Operating Costs

After restructuring their supply chains for Build-To-Order processes, manufacturers expect to reduce costs for order processing and communication among supply chain members. An overall increase of operating efficiency and accuracy is supposed to come along with the adoption of Build-To-Order principles.

Without any doubt, there are more goals involved with the Build-To-Order transformation, but the goals mentioned above were consistently stated among companies applying Build-To-Order. How those objectives have been achieved by those firms will be the main emphasis of the following analysis. A precise outline of the transformation combined with analysis of specific financial measures will be used to determine the impacts of each transformation and will show how well each company performed in achieving its goals.

4. Methodology

The Case Study Approach

After consideration of different methods for analysis of transformations, the Case Study Research Method (Eisenhardt, 1989) seemed most appropriate for the purpose of this paper. Since the interpretation and implementation of Build-To-Order strategies is so different among each company, each transformation is studied as an individual case. The analysis of those cases includes a qualitative and quantitative part.

For the qualitative part of the analysis major steps within the transformation process are identified and outlined on a time basis. It is important to identify, which specific strategies and actions were taken by the company to achieve customization and which problems were encountered in the process of implementing Build-To-Order. Through the qualitative analysis of various cases best practices can be derived and common mistakes identified.

For the quantitative/financial analysis, it was crucial to identify a point of time from which the company started to pursue intensively the implementation of Build-To-Order principles. Using this event for analysis of financial measures provides information on how successful the company was in implementing Build-To-Order. The switch to Build-To-Order often requires long implementation processes. Consequently, five years before and after the transformation starting event was defined as the time period within which transformation impacts were measured.

Diagrams of performance measures over the analyzed time period were used to picture the transformation process and match transformation steps with financial performance. Within each industry, statistical analyses were conducted to determine significant impacts of the Build-To-Order transformations in this industry. Cross industry comparisons were also performed. In order to perform these analyses, data from individual companies were

time-adjusted such that the point of transformation is always year zero. Thus, all data sets were for time periods of minus five to plus five years. Note that available data were not always complete, requiring adjustments (e.g., interpolation) to provide comparable data sets from each company in an industry.

Data Sources:

To get accurate results and unbiased information, multiple data collection methods were utilized for this study. Besides a broad literature review to assess the topic of Build-To-Order, company specific information and announcements were acquired through Factiva, a company news and announcement database. Financial data was provided through Compustat North America and Compustat Global, which both are Standard & Poors financial databases containing over 300 financial variables for companies publicly traded in the US and Canada (Compustat North America) or publicly traded in more than 80 countries (Compustat Global), respectively.

The utilization of annual reports of each company provided further company information and more detailed data than through Compustat database. Especially for automobile companies, which have a lot of non-core business activities, like car financing or commercial vehicle production, using segmented data was important to increase explanatory power of the analysis. Since the data from annual reports was different, this data was only employed within each company case and some industry analysis.

5. Variables and Hypothesis:

For the analysis of performance of companies relative to the three above stated goals of the Build-To-Order transformation, the following financial measures were chosen:

a) Days of Inventory: *(= Inventory * 365 / Costs of Goods Sold)*

The main reason of adopting Build-To-Order strategies is reduction of inventory. The measure Days of Inventory represents a good indicator for inventory level change, since it accounts for cost and sales fluctuations. Depending on availability within each case, inventory data is segmented in: Total Inventory, Raw Materials Inventory, Work in Progress Inventory and Finished Goods Inventory. All four of those variables are utilized to calculate the days of inventory for each type to detect changes in inventory levels across any part of the production process.

Hypothesis: Inventory levels should significantly decrease after Build-To-Order strategy was implemented.

b) Revenue per Unit Sold *(= Net Sales/Unit Sales):*

A Build-To-Stock policy does not guarantee that every customer gets exactly what he or she wants. This becomes a significant problem if heavy price discounts are needed to get rid of huge inventory stocks. Many car manufacturers are facing this problem and hope with Build-To-Order strategies and customization to mitigate losses through discounting.

Revenue per Unit Sold will provide information on improvements in terms of prices and discounts.

Hypothesis: Build-To-Order increases revenue per unit sold, because each customer is willing to pay a markup for customized car. Moreover, Build-To-Order decreases lost revenue through discounts.

c) **Profit Per Unit Sold *(= Operating Income/ Unit Sales):***

This measure is utilized to monitor changes in a manufacturer's ability to create higher profit per unit through higher operational efficiency. Since low profit margins are a major issue in the automobile industry, this measure was only deployed for automobile cases.

Hypothesis: Build-To-Order requires fast and streamlined operations among supply chains and should therefore increase operational efficiency, which should decrease operating costs and increase operating income.

6. Company Cases

In this section the sample of companies are discussed and a qualitative and qualitative analysis is conducted within each industry. The section concludes with a comparison of Build-To-Order transformation across industries. Note that inventor data for each company are presented for the computer industry in Appendix A and the automobile industry in Appendix B.

6.1 The Computer Industry

After thorough investigations of companies in the computer business Apple, Hewlett Packard and Compaq were identified as computer manufacturers, which had transformed from a Build-To-Stock to a Build-To-Order process. Ingram Micro, which is a computer wholesaler, was included in the computer case sample to enrich the case analysis by adding a different Build-To-Order approach. Dell serves more as a benchmark and best case for successful Build-To-Order. Dell adopted Build-To-Order very early in its company history and provides a good case for comparison and evaluation of Build-To-Order transformations.

Transformation Timelines

A transformation timeline for each computer company was constructed, drawing upon both company and open sources. This timeline depicts the major steps in the transition towards Build-To-Order of each company in the sample and provides a good overview to facilitate the case analysis.
In the computer industry transformations towards Build-To-Order were commonly initiated through large E-commerce implementations accompanied by a new Build-To-Order product family. All of the structural changes required for a running Build-To-Order operation were mostly finished within one year. Therefore, the year when a company introduced their first Build-To-Order product was taken as a transformation starting point (year zero). Five Years before that year were included in the analysis to detect any

previous trends. The five years after the Build-To-Order introduction should indicate any impacts and changes on performance trends of the companies, which could be results of Build-To-Order implementations.

Results

Generally speaking, all of the five sample companies achieved good and significant results in reducing their inventory levels. Comparing the beginning and end of the 10-year time period surrounding the transformation point, average number of days of inventory dropped from 90 to 25 ($p = 0.002$). The following similarities among approaches to Build-To-Order may provide an initial basis for identifying more-specific best practices.

E-Commerce

A main part of the Build-To-Order transformation and most often the initial action is the connection of customers through a special internet website, which provides detailed product information and supports Build-To-Order product purchases.

Channel Relationships

The transforming companies based their Build-To-Order approach heavily on their existing distribution channels. Instead of following the successful Dell approach of direct sales without any middlemen, Apple, Compaq and HP intensified their existing relationships with distribution channels and incorporated them into their Build-To-Order concept.

Supply Chain Aspects

To increase responsiveness and decrease lead times, Build-To-Order approaches were focused on pushing product configuration downstream. HP started to assemble desktops in its own distribution centers, Compaq and Apple involved their resellers in configuration and assembly of their computers and wholesaler Ingram adopted a configuration of computer components manufactured by Solectron.

6.2 The Automobile Industry

The companies considered in the automobile included major car manufacturers as BMW, DaimlerChrysler, Ford, GM, Nissan, Renault, Toyota, and Volvo. Considering the timelines of major Build-To-Order transformations of automobile companies, substantial differences between both industries become apparent. The automobile Build-To-Order transformation requires more steps and more time than the transformation towards Build-To-Order in the computer industry, which indicates greater difficulties and higher complexity of Build-To-Order implementation in the automobile industry.

Transformation Timelines

Since the transformation steps are spread out over many years, it is much more difficult to define a transformation starting point for most of the car manufacturers. For the following analysis the first concrete moves and actions of automobile companies, which indicate a change of their focus from forecasts towards individual customer orders was considered as the start of transformation (year zero). Typical indicators and actions were:

- Online ordering: launch of customer facing web sites, which offer cars built to customer's specifications and setting up a linkage between customer and the production plant

- Build-To-Order initiatives or programs in terms of serious effort towards achievement of Build-To-Order production focusing on production and operational issues

As opposed to the computer industry, where the first Build-To-Order product introduction determined the transformation start, in automobile cases cars have been both mass produced and customized for a long. However, at that time it was not a mass customization approach as the customized portion of cars has been very small. Further, the lead time needed to fulfill a customer specific order usually amounted to 6-8 months. For this analysis, therefore, it is misleading to assume that the transformation started with the first Build-To-Order car.

For this study it is intended to capture the whole process of transformation to evaluate each approach from the beginning, which mostly starts with a major effort aiming at a realizing Build-To-Order for a large proportion of sales. The achieving of short lead times and substantial Build-To-Order product lines is then the result of a completed transformation. Effects and improvements along the way towards this main goal is the major focus of this analysis.

This analysis shows that in the automobile industry each Build-To-Order approach is very different in terms of length and intensity. To be able to conclude best practices, it is important to capture financial effects of the very first transformation steps.

Results

Overall, the eight sample companies failed to achieve significant results in their inventory levels. Comparing the beginning and end of the 10-year time period surrounding the transformation point, average number of days of inventory increased from 44 to 48 days, which was not statistically significant.

Compared to the computer industry cases the Build-To-Order implementation strategies and results are much more diverse. Among the eight automobile companies common and popular strategies were observed, but a general approach towards Build-To-Order does not really exist.

Dealer Network

Most of the car makers initiated their Build-To-Order programs with the launch of dealer network systems to reach each individual customer. Each dealer connected to the system can place orders for customers directly to the production plant. This system combines both consulting and services from the dealer and establishment of a direct link to the customer. Ford and GM tried to further expand the reach of their Build-To-Order program through E-commerce capabilities. They partnered with car-seller web site firms to offer customized cars through the internet like Dell.

Lead Time

Lead time was identified by every company as the most critical factor for success of their Build-To-Order program. A commonly used lead time threshold for successful Build-To-Order is 14 days. The huge differences among car makers in effectively reducing their lead times indicate the difficulty of this task. BMW, for example, took four years to achieve a lead time of 12 days after initiation of the COSP (Consumer-Oriented Sales and Production) program. In contrast, GM, four years after their first measures towards Build-To-Order, still required 27 days of lead time.

Partnerships

Especially, Ford and GM relied on joint ventures and outsourcing of operations to restructure their production, sales and distribution process. Ford, for example, launched four major joint ventures and two alliances in order to achieve Build-To-Order compatible processes. GM launched the joint venture Vector SCM together with CNF Transportation to completely outsource their logistic operations. Other car manufacturers tried to accomplish the challenges of Build-To-Order implementation with own capabilities like BMW, DaimlerChrysler, Nissan, and Toyota.

Regarding the financial analysis the following results and conclusions were observed:

Inventory

Total: In terms of Total Inventory levels most of the car companies performed poorly after starting the Build-To-Order transformation. Only Volvo was able to turn increasing inventory before, into a decreasing trend after launch of their Build-To-Order transformation. Daimler Chrysler and Nissan were able to maintain their decreasing trend of their inventory. BMW and Toyota were able to lower the annual rate of inventory increase they experienced before their transformation efforts. Ford, GM, and Renault increased their inventories.

Finished Goods: For finished goods inventory the results look very similar. Volvo is again the only company with a real impact of their transformation efforts.

Raw Material and WIP: Only three companies, e.g. BMW, Daimler Chrysler, and Toyota, provided data about Work in Progress Inventory and Raw Material Inventory. In

all three cases Build-To-Order implementation did not have an impact on both inventory level types.

Revenue per Unit Sold

The results for average revenue generated by an individual car look much better than the inventory numbers. In this category GM, Nissan and Renault were able to improve significantly their performance. BMW and the Mercedes Car Group were able to sustain their growth rate of revenue per unit. Only Chrysler Group, Ford and Toyota experienced a decrease in their annual revenue growth rate after starting to transform. Toyota was the only company that had negative performance after starting its Build-To-Order program.

*Regional Numbers***:** For Daimler Chrysler, GM, Nissan and Toyota revenue per unit measures were available segmented by region, which provides interesting insights into performance of car makers in North America and Europe, where the Build-To-Order programs efforts had been emphasized. For all four companies North America was the best and Europe was the worst region in terms of revenue per unit sold. However, in Europe the revenue per unit went up significantly for all of the four firms. In North America, Chrysler Group, Nissan, Toyota had stagnant performance, whereas the GM and Mercedes Car Group performed well.

Profit per Unit Sold

In this category results differ strongly among the car companies. Strong performance after starting with Build-To-Order transformations was observed for BMW and Nissan with up to 46% average annual increase of profit per car. Toyota was the only company with moderately positive results. All other companies in the sample had a negative trend for this performance measure.

*Regional Numbers***:** For Nissan and Toyota regionally segmented profit and unit sales data was available. Both companies have significantly increased their profit per unit sold in Europe and North America. Interestingly, Nissan and Toyota had a stagnant trend for their unit revenues, but a strong increase in unit profit at the same time. This indicates, that both companies achieved significant cost savings after starting to transform, which provides strong evidence for the successful implementation of Build-To-Order operations.

Discounts

In their annual reports, Ford and GM included the balance sheet item *Dealer and Customer Allowances, Claims and Discounts* (listed under Deferred Tax Assets), which serves as an indicator for amount of discounts given to customers. With regard to this performance variable, Ford and GM were not able to decrease their expenses for sales discounts, which supports the assumption, that Ford and GM were not successful in implementing Build-To-Order.

7. Industry Comparison

Comparing the computer and automobile industry in terms of their success in reducing inventories, the computer industry definitely performed better. Every computer company was able to slash their inventory levels from 100 days or more to 5-30 days. Only HP was not that successful, still having 60 days of inventory. This result was fully expected, but nonetheless proves that Build-To-Order transformation can have a measurable financial impact.

In contrast is the poor performance of the car industry. Most car companies still hold between 40 and 70 days of inventory, which leaves them far behind computer manufacturers. Only one car company (Volvo) experienced significant benefits from their new strategy implementing Build-To-Order. However, Volvo was doing very badly before transforming towards Build-To-Order, having almost 100 days of inventory. Improving this bad situation might have been an easier task.

Statistically, the computer industry was performed significantly poorer at the beginning of the 10-year period centered in the transformation point, averaging 90 days of inventory to the automobile industry's average of 44 days ($p = 0.012$). The computer industry's 72% reduction of inventory over the 10-year period was significantly better than the automobile industry's lack of improvement ($p = 0.0003$). At the end of this period the computer industry was almost 50% more efficient (in terms of inventory) than the automobile industry, although this difference was marginally significant ($p = 0.11$).

Another striking difference between both industries is the amount of time needed for transforming towards a Build-To-Order operation. Computer manufacturers typically restructured their supply and distribution chain within one or two years, whereas even the fastest Build-To-Order implementers in the car industry, like BMW, needed four years. Others like Ford and GM still have not reached their Build-To-Order goals even after five or six years, respectively.

Reasons for such a performance gap lie in specific industry characteristics. Cars are much more complex than computers. Each car is assembled out of 2000 to 4000 parts, which have high variety in size and weight. Computers instead are made of about 50 parts, which all are relatively small and light, so it becomes much easier to optimize handling and transportation operations within the supply chain.

The distribution channel for cars is also more complex. In many state, legislative mandates requirements dictate that cars be sold through dealerships. Further, these dealers typically need more variety of body types, colors, etc. than associated with computers.

8. Conclusion

This study provides a comprehensive overview of the performance impacts on two industries that embarked on the journey of implementing Build-To-Order. After having analyzed the performance of all 13 different cases of companies transforming towards Build-To-Order, many interesting results have been observed. The computer industry

proved that there is a benefit of Build-To-Order. On the other side the car industry shows how difficult the implementation of Build-To-Order can be.

Clear evidence of Build-To-Order effects on financial performance was only found in the case of computer manufacturing. While the best practices in Build-To-Order were pioneered by Dell, many different ways were used to reach a customer-oriented production approach. In cases like Apple, Compaq and HP good improvements were achieved without a pure Dell approach. Once a company has concentrated on a specific distribution channel, it is very difficult to change it completely. Indeed, all three companies are utilizing direct sales, and the main portion of their sales still flows through their old channels. Despite these differences, the analysis of this industry proved that Build-To-Order results are measurable.

Looking now at the Build-To-Order performance of the automobile industry the results in terms of inventory levels are indeed disappointing. Lengthy efforts and substantial investments had no significant pay back for most of the companies in terms of inventory reduction.

The situation is more positive when looking at profits per unit sold, where some companies achieved very convincing results. For the majority of car makers in the sample, improvements due to Build-To-Order implementations were only found for revenue per unit sold.

Admittedly, it is difficult to fully attribute revenue and profit improvements solely to Build-To-Order strategies. However, as an initial approach these results might demonstrate where to locate primary effects of Build-To-Order adoptions in the car industry. Financial reactions of Build-To-Order implementations were measurable in profit and revenue per car. Here it was possible to distinguish Build-To-Order leaders and laggards.

The financial scope of the performance variables chosen should be considered. Revenue and Income include all aspects and levels in the company affected by Build-To-Order, whereas inventory is a focused measure. The Build-To-Order transformation, since it is affects many levels of a company, will have a faster impact on more general variables. Thus, revenue and profit per car indicated improvements for some companies, but in terms of inventories, no significant impact of Build-To-Order was observed.

Increased revenues per car achieved by many car companies indicate higher customer value through transformation towards customized cars. Tools like dealer network systems and e-commerce seem to help car makers to increase value. BMW, Nissan and Toyota were able to achieve operational improvements followed by cost savings through Build-To-Order strategies, which was reflected in their profit per car performance.

Inventory is still important to measure for Build-To-Order transformations. Since reduction of inventory is a major goal of the Build-To-Order efforts stated by each automobile company, inventory reduction was expected. Perhaps inventory reductions may appear later in the transformation process in this industry. Regarding this, no car company has finished its transformation.

Finally the three performance measures used in this study have proven themselves as good indicators for measuring Build-To-Order performance. Best practices should be derived from companies, which performed well. For inventory reduction, the computer industry should be further considered for Best Practices that might be applied in the automobile industry. In terms of revenue per car BMW has the best performance and should be further analyzed. Concerning profit per car BMW and Nissan have set a benchmark in using successful Build-To-Order for improvements.

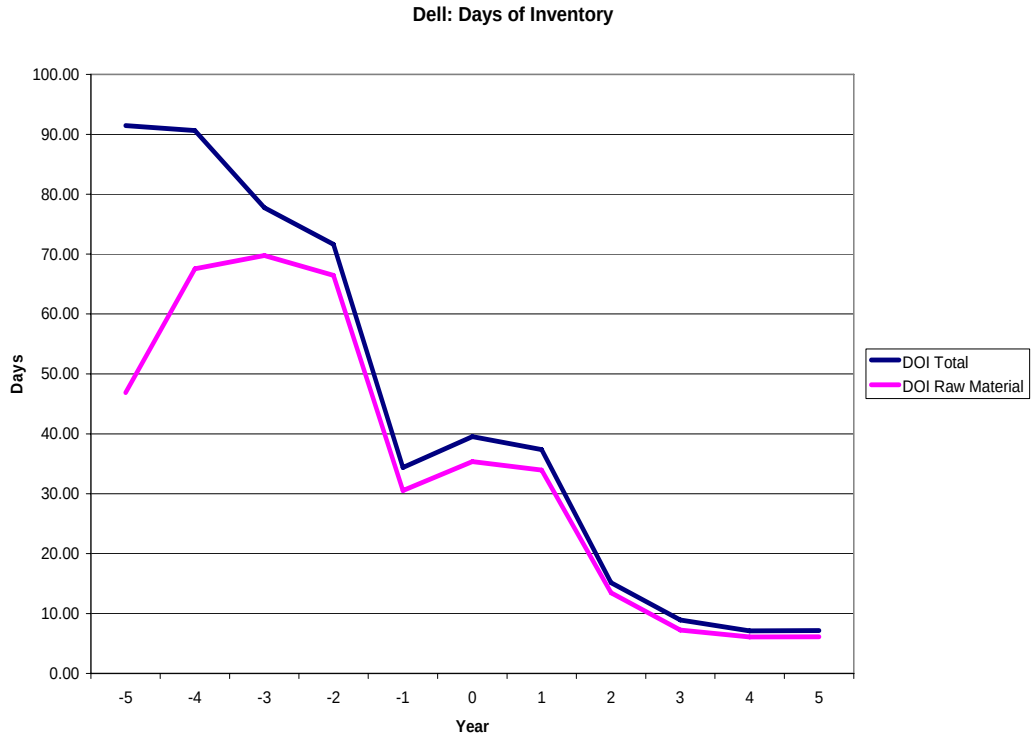
Now that a case-based overview of the financial performance of Build-To-Order transformations has been provided, further study is needed to link precisely individual Build-To-Order efforts to specific financial outcomes over time. Such an analysis could provide concrete investment guidance, which might support decisions making of companies as they start to adopt Build-To-Order principles.

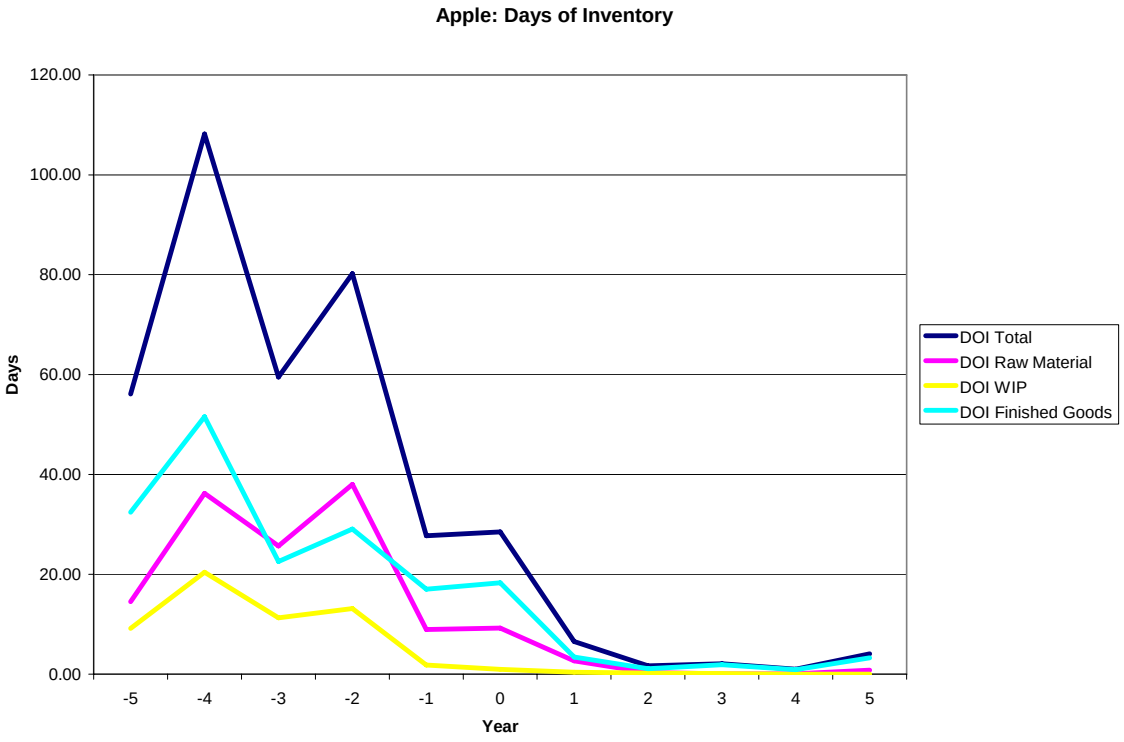
Reference

Eisenhardt, K.M., (1989). Building Theories from Case Study Analysis. Academy of Management Review, 14 (4), 532-550.

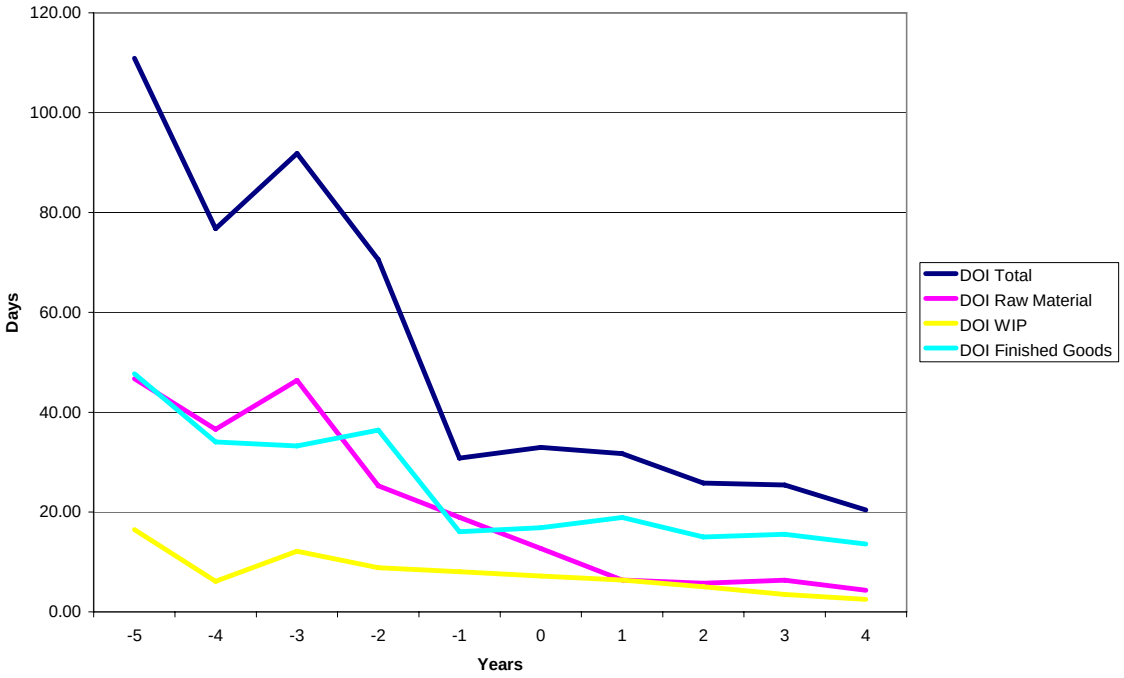
Appendix A

Inventory Data for Computer Industry





Compaq: Days of Inventory



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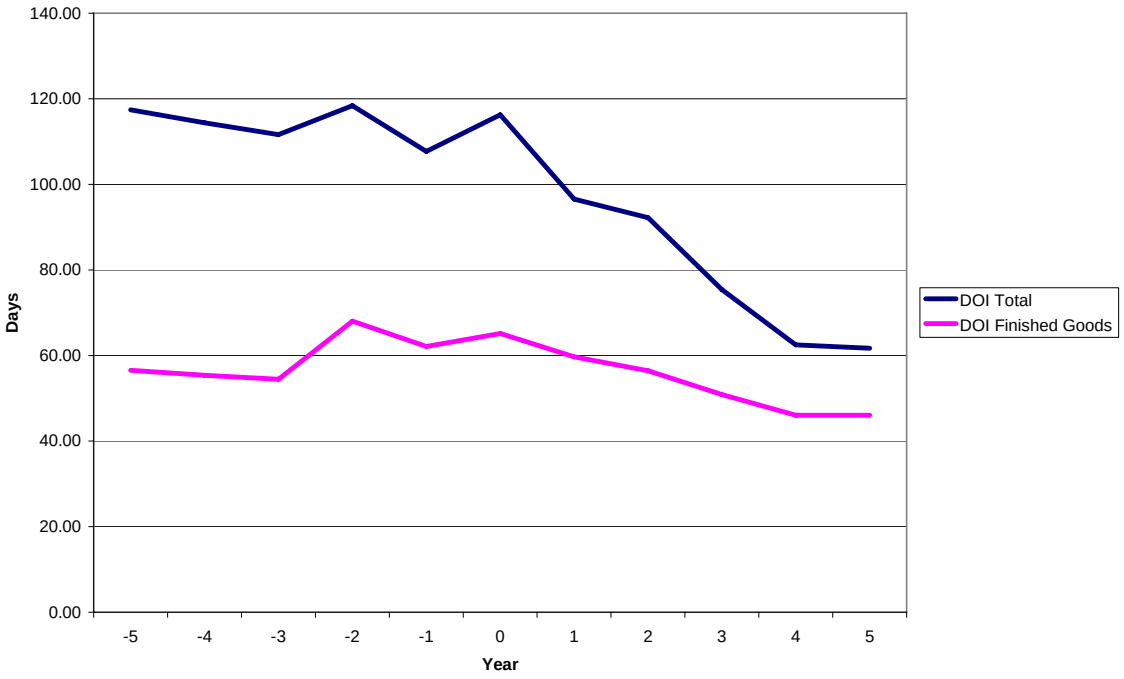

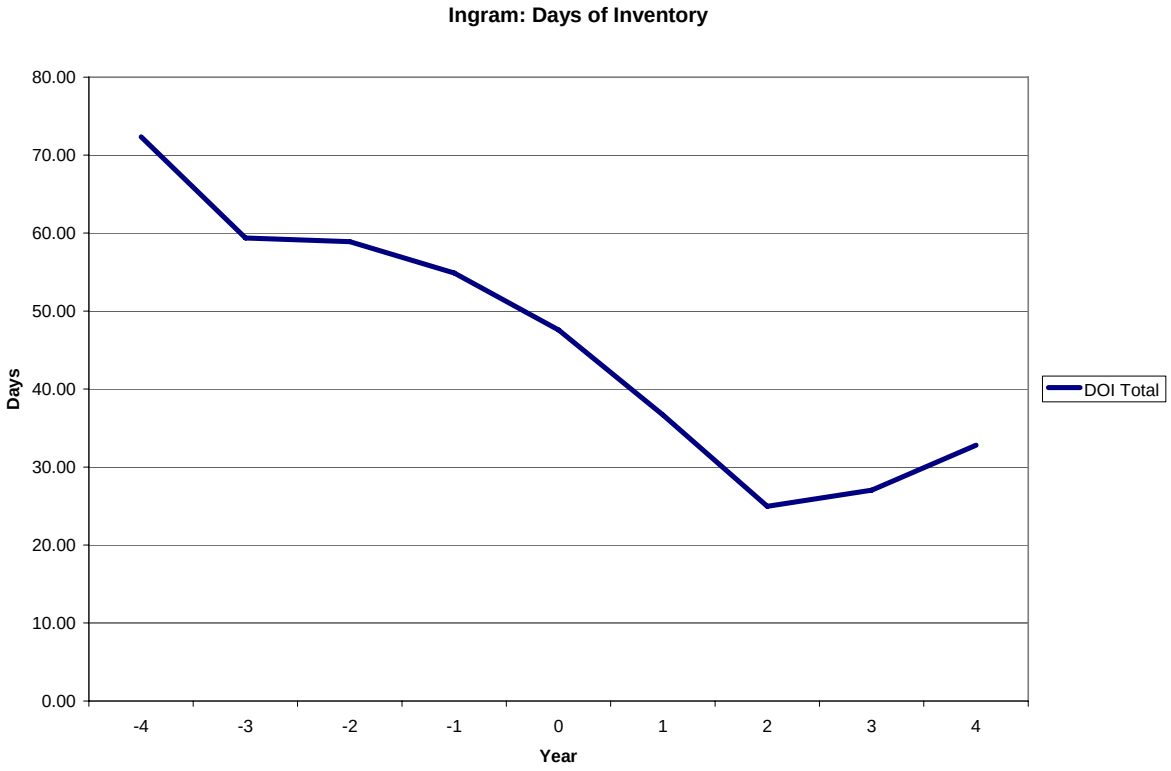
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20.00
10.00
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-2
-1
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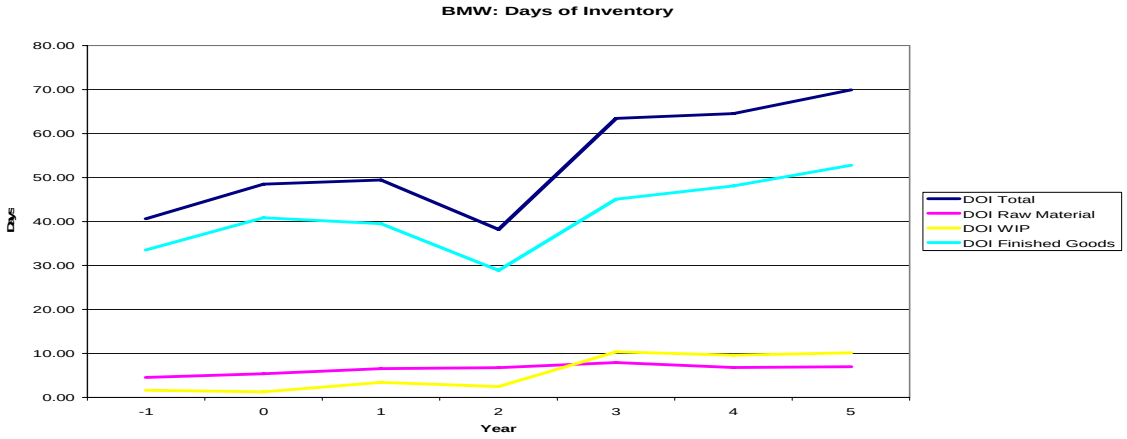
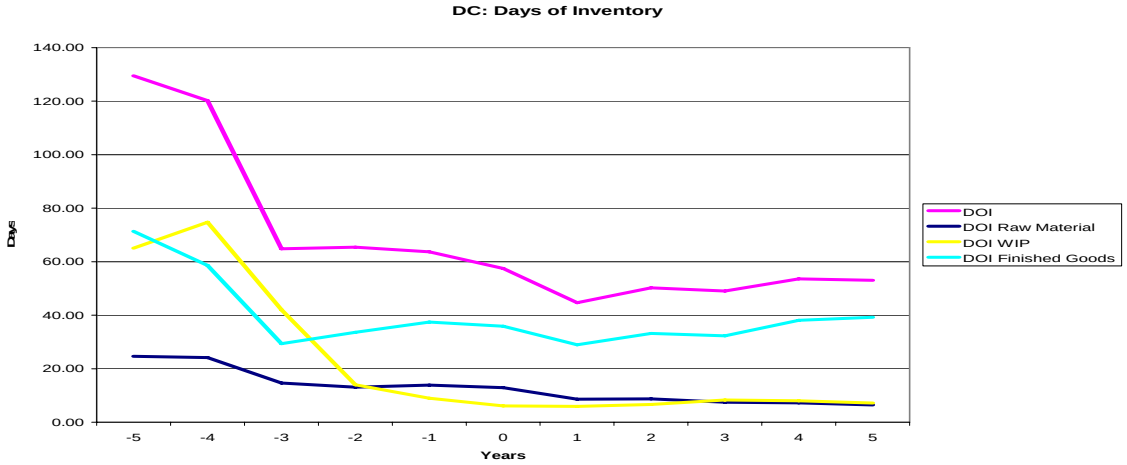
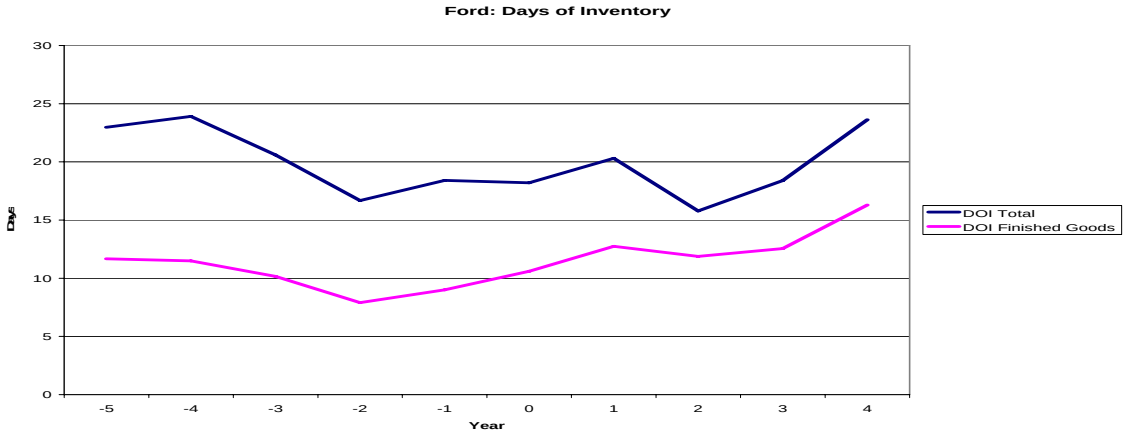
1
2
3
4
Year
DOI Total

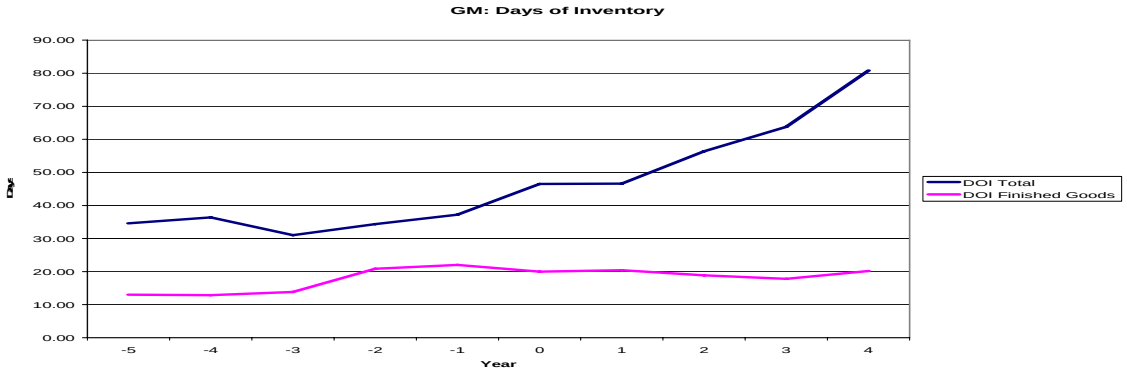
Appendix B

Inventory Data for Automobile Industry








GM: Days of Inventory
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Year
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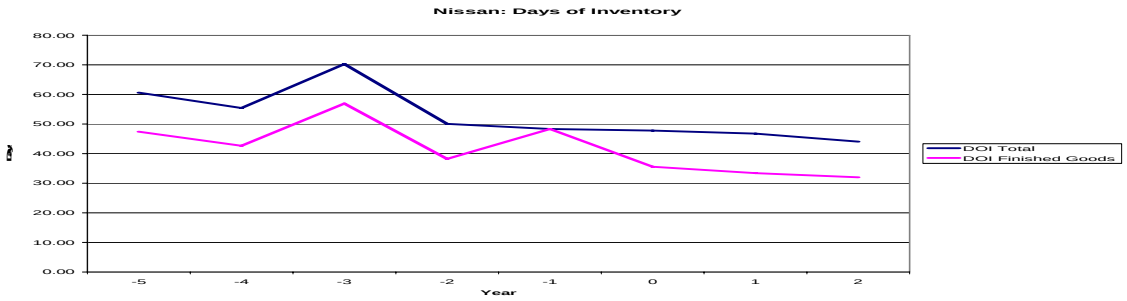
Nissan: Days of Inventory
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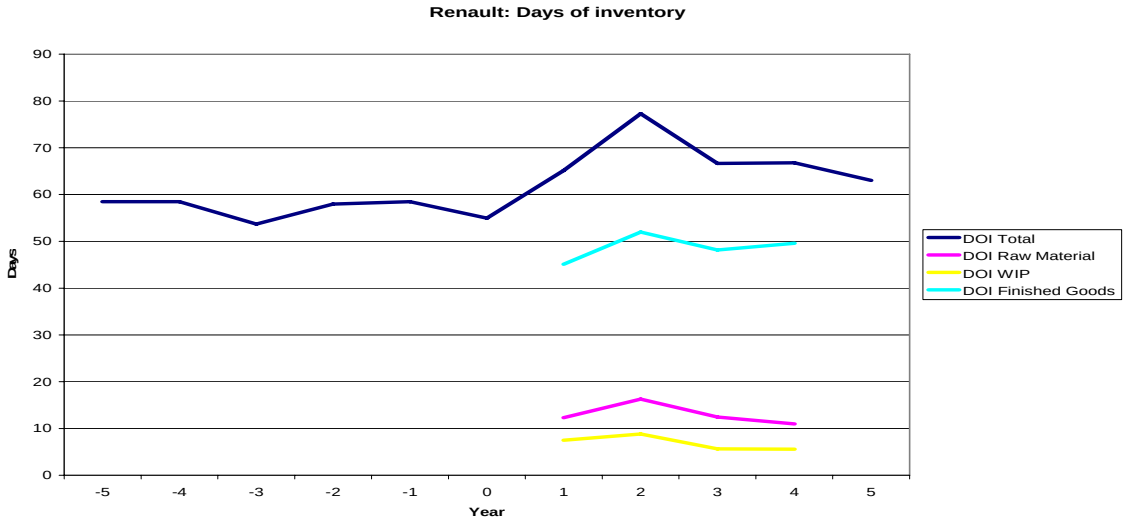
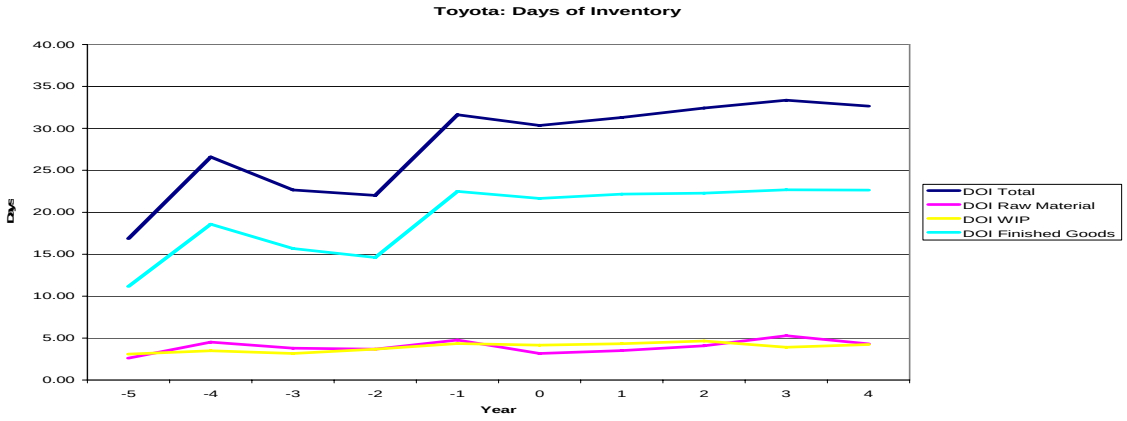
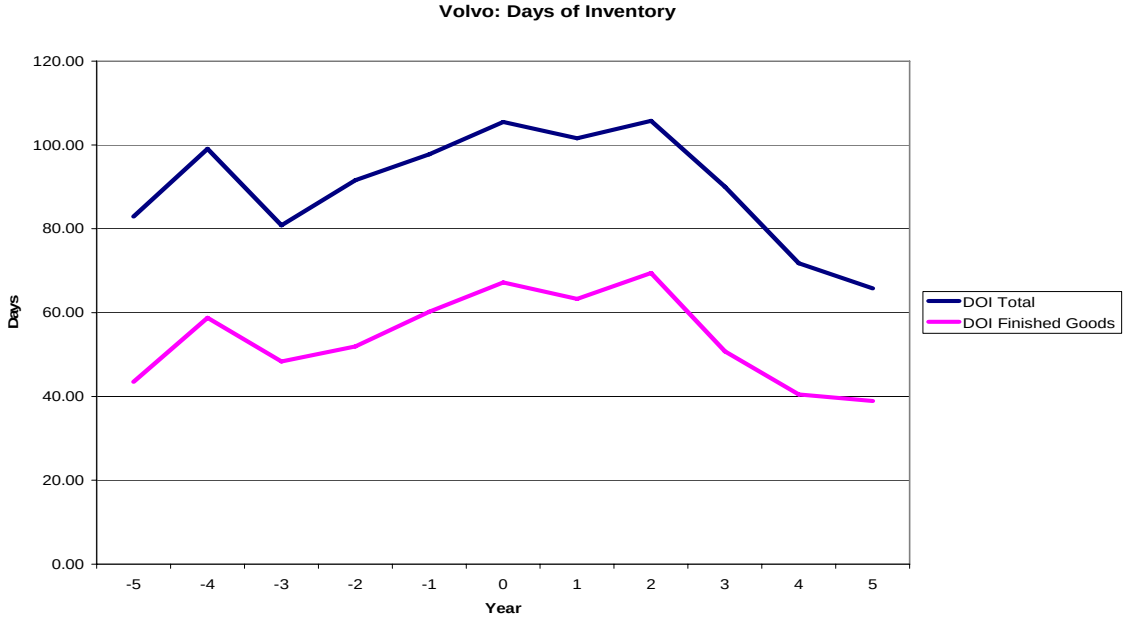
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
-5
-4
-3
-2
-1
0
1
2
Year
DOI Total
DOI Finished Goods


Renault: Days of inventory
90
80
70
60
50
40
30
20
10
0
Days
-5
-4
-3
-2
-1
0
1
2
3
4
5
Year
DOI Total
DOI Raw Material
DOI WIP
DOI Finished Goods


Toyota: Days of Inventory
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5
-4
-3
-2
-1
0
1
2
3
4
Year
DOI Total
DOI Raw Material
DOI WIP
DOI Finished Goods


Volvo: Days of Inventory
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Days
-5
-4
-3
-2
-1
0
1
2
3
4
5
Year
DOI Total
DOI Finished Goods