Drivers for improving supply chain performance: an empirical study

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Abstract: A lot of innovation happening nowadays is not so much in the products as in the processes. The importance of integrated, globally optimised supply chains is well understood. Executives have discovered the impact on business performance that can be achieved by effectively managing their supply chains. Nevertheless, a recent study shows that only a fraction of today's supply chains are managed efficiently. One important reason is the mounting challenges faced by executives. These include globalisation and outsourcing, a significant increase in supply and demand uncertainties, more products with short life cycles and the proliferation of products in today's markets. We will identify measures to characterise the business performance as well as supply chain effectiveness and develop measures to characterise the level of maturity of the business process and the information technology employed by a company. Our objective in this research is to identify enablers that allow companies to manage their supply chains so as to maximise business performance. We focus on two classes of enablers: business processes and information technology.

Keywords: supply chain management; performance measurement; business processes; information technology.

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1 Introduction

A lot of innovation happening today is not so much in the products as in the processes – the way in which the businesses are run.

In recent years, supply chain management (SCM) has been the focus of executive meetings, business columns and research institutes as never before. The importance of integrated, globally optimised supply chains is well understood. Executives have discovered the impact on business performance that can be achieved by effectively managing their supply chains.

An agile organisation that can manage its business processes has become more and more important than the classic marketing mix of a strong brand and a great product. The CEO of Nokia says, 'in the future, Nokia will compete not so much through what we do as how we do it'. According to Dell, the supply chain is 'the biggest leverage point we have'. The Spanish clothing manufacturer and retailer Zara says, 'the supply chain is the business model'. These are all companies that have been very innovative in their business processes which led them to a sustainable, competitive advantage. For instance, Wal-Mart's success story is partially attributed to the implementation of comprehensive information technology throughout their supply chain, to strategic partnering with their suppliers and to the implementation of an innovative logistics strategy called cross-docking. Similarly, Dell uses technology and information to blur the traditional boundaries in their supply chain that includes suppliers, manufacturers and end users (Kapuscinski et al., 2004). Finally, Zara, the Spanish clothing retailer, uses information extensively to integrate store managers with the company's design and manufacturing executives (Heft, 2002).

On the other hand, a recent study shows that only a fraction of today's supply chains are managed effectively. One important reason is the mounting challenges faced by the executives. These include globalisation, outsourcing, significant increase in supply and demand uncertainties, more products with short life cycles and the proliferation of products in today's markets.

Therefore, we have to identify measures to characterise the business performance as well as supply chain effectiveness and development measures to characterise the level of maturity of the business process and the information technology employed by a company.

A performance measurement system providing information on ongoing process performance and showing the effects of process changes is a basic prerequisite for improving processes. This article will look at current research in this field.

By an empirical study we will try to answer questions such as: Is there a direct relationship between a firm's IT strategy and supply chain performance? Can the poor performance of most supply chains be explained by lack of effective business processes? More importantly, is there a direct link between supply chain performance and the company's bottom line?

Our objective in this research is to identify enablers that allow companies to manage their supply chains so as to maximise business performance. We focus on two classes of enablers: business processes and information technology.

Specifically, our aim is to find whether or not there is a direct dependency between the maturity of the business process, the amount of investment in IT infrastructure and supply chain performance. Further, the purpose is to identify the impact of investments in these two enablers on the firm's profit. For instance, can companies achieve a sustainable competitive advantage through IT? Is it essential to complement investment in information technology with significant effort in business processes? And finally, what strategy should a company use in deciding what to invest in? That is, given its position in the market, should a company invest in improved business processes, more information technology or both?

2 Supply chain performance management

In the last few years, many companies have used key performance indicators (KPI) to identify opportunities and challenges in their supply chains. A general overview of suitable metrics to measure the effectiveness of SCM has been given by Otto and Kotzab (2003). They identified these metrics under consideration of the main disciplines (systems dynamics, operations research/information technology, logistics, marketing, organisation and strategy), which contribute to the field of SCM. The main emphasis in our paper is on logistics and information technology. Furthermore, we want to take also the efficiency perspective into account.

In this context, one of the benchmarking methodologies is of special interest, the supply chain operations reference (SCOR) model developed recently by the Supply Chain Council (Meyr et al., 2002). SCOR is a process reference model that aims to provide a cross-industry standard for SCM. The SCOR model provides also definitions of standard KPI to benchmark value chains and to find potential for improvement.

It is worth pointing out that established quality management systems (ISO 9001, QS 9000, etc.) and, of course, the total quality management models based on them, already cover many company-internal processes that are also important for value-chain management. This is hardly surprising as quality management systems make it necessary to consider customer requirements, when managing internal business processes. But the problem is that these systems do not take into account inter-enterprise processes as they only deal with interfaces between the enterprises (procurement, shipping, products supplied, etc.), see e.g. Al-Mudimigh et al. (2004).

Selected examples of such inter-enterprise supply chain processes are collaborative product development, sales and operation planning (S&OP), distributed order processing and service processes (e.g. recycling). Another key to improving performance of inter-company processes is the design of the value chain. Strategic decisions on

outsourcing (make or buy), configuration of supply chain processes (e.g. development, order processing), long-term capacity planning, development of partnerships, etc., play a vital role.

For performance improvements, KPI must be allocated after the new processes have been identified and defined. The target values for these KPI should be derived from the corporate strategy as well as the supply chain strategy developed from customer requirements (Christopher and Towill, 2000).

We will focus in our discussion of KPI on performance monitoring, continuous improvement and benchmarking supply chain processes (Johnson, 2001; Lee, 2002). Before we look at KPI in detail, we need to differentiate between performance effectiveness and performance efficiency.

The efficiency of a process can be described as the relationship between the output of the process and the resources used (input). Businesses use a host of indicators to determine efficiency. The selection and application of these indicators provide various perspectives, with the focus on costs or time (e.g. lead-time efficiency = processing time/lead time). Processes are normally executed in order to attain a certain goal, although the results achieved do not always correspond with the target. The process effectiveness can therefore be defined as the degree of target achievement, or the extent to which the results match the targets. Both the efficiency and the effectiveness of a process are inherent indicators of process performance, whether they are measured or not (O'Donnell and Duffy, 2002).

For instance, the degree to which process performance meets customer requirements can be used to measure the effectiveness of the process performance. The efficiency can be ascertained by means of the KPI (lead times and so on).

3 Company performance indicators

To assess and improve a company's process efficiency KPI that are specific to products and processes, such as storage capacity, lead times, net asset turns (inventory turnover of the fixed assets + current assets) are needed. These indicators must fulfil two requirements: firstly, they contribute to efficiency measurement and secondly, it must be possible to determine their financial effects.

3.1 Indicators to determine the efficiency of supply chain processes

In order to monitor and examine supply chain processes, indicators also need to be defined for inter-enterprise processes (Gunasekaran et al., 2004). Here, three groups can be identified (Reiner, 2004).

- *Generic supply chain KPI*: The problem with some indicators (e.g. service level) is that they cannot be aggregated over multiple supply chain levels (Fransoo and Wouters, 2000). It is therefore necessary to use generic indicators to evaluate the efficiency of the entire supply chain. For instance, the service level as perceived by the end consumer is also a generic indicator for the performance of the whole supply chain, as this indicator includes the performance of the stages preceding it in the chain.

- *Aggregated KPI*: These indicators can be aggregated over multiple supply chain levels (different enterprises or supply chain partners) and include storage capacity, costs, lead times, stocks.
- *Cross-process KPI*: These indicators can also be aggregated, but in this case over multiple supply chain processes (e.g., cash-to-cash cycle time, time-to-market). Thus, the time-to-market indicator provides information on the performance of the processes for product development and order processing including transition to production and production.

3.2 Key performance indicators to determine effectiveness

The satisfaction (or otherwise) of end consumers with a specific product can be used to determine the effectiveness of supply chain processes. There is a direct or indirect correlation between the indicators and consumer satisfaction. In the B2B area, customer satisfaction can also be utilised to measure the effectiveness of business processes. In this respect, effectiveness is also measurable through the level of target achievement of other KPI, (costs, etc.). However, many industries choose customer satisfaction on the basis of its importance to inter-enterprise processes (Rust et al., 1994).

3.3 Qualitative generic supply chain performance criteria

As well as the quantitative key performance indicators described above, a comprehensive supply chain performance measurement system should also take into account qualitative generic indicators about the network itself. Hieber (2002) distinguishes between collaboration (strategic alignment of the supply chain, inter-enterprise collaboration on planning activities), coordination (availability of information, communication) and flexibility of supply chain partners (expertise, knowledge-sharing), in which the focus is on comparing best practices rather than obtaining a particular score.

4 Framework of identifying best-practice supply chains

We have already extensively discussed performance measurement systems. Now, we focus on two enablers that allow companies to manage their supply chains in order to maximise business performance – business processes and information technology. Measuring the level of maturity of the business process or the information technology infrastructure that a company possesses is not easy. What makes this a real challenge is the fact that different portions of the company's business can be at a different maturity level. In fact, even the same portion of the business may be out of balance in the sense that the maturity of the business process and the information technology do not complement one another very well. Thus, in our survey, we have developed two sets of questions; one to characterise the level of business maturity and the second to characterise the maturity level of the information technology.

To identify the overall level of maturity of the firm's business processes, we introduce four categories of business processes (see also Weber and Dehler, 1999):

Level I: *Disconnected processes*. Companies at this level are characterised by the proliferation of many independent processes. Companies are organised functionally with no or low degree of integration. Supply chain planning is typically done for each site independently of other sites. Characteristics of this level include:

- functional (silo) strategies;
- lack of clear, consistent SCM processes;
- there are no measurements, or measurements are not aligned with company objectives.

Level II: *Internal integration*. At this level, companies are organised functionally, with a high degree of integration. Decisions are made through the integration of key functional areas, i.e. sales, manufacturing and logistics. Common forecasts are applied throughout the organisation. Characteristics of this level include:

- integration of some functional information to decrease inventory and improve efficiency;
- documented processes that are followed across the entire organisation;
- key measurements that are used departmentally.

Level III: *Intra-company integration and limited external integration*. Globally operating companies are cross-functionally organised. Organisations at this stage involve key suppliers and customers in decision-making processes. Characteristics of this level include:

- decisions that are optimised across the internal supply chain;
- sophisticated processes that involve all affected internal organisations;
- key suppliers and customers that are included in supply chain planning.

Level IV: *Multi-enterprise integration*. Organisations at this level apply multi-enterprise processes, use common business objectives and have an extensive knowledge of the supplier and customer business environments. Collaboration links trading partners and enables them to operate as one virtual corporation. Characteristics of this level include:

- collaboration across the entire supply chain;
- internal and external collaborative SCM focus on key service and financial goals;
- measures that directly link supply chain results to company goals.

Of course, the different level of business processes needs to be supported by a corresponding information technology infrastructure. For this purpose we introduce four different categories of IT systems:

Level I: Batch processes, independent systems and redundant data across the organisation. Focus on spreadsheet and manual manipulation of data for decision making.

Level II: Shared data across the supply chain. Decisions are made using planning tools that apply data across the supply chain, e.g. demand planning module that applies expert knowledge, advanced algorithms and statistical methods for forecasting.

Level III: Complete visibility of internal data; key suppliers and customers have access to some of this data, e.g. forecast is shared with key suppliers. Processes, not only data, are shared across the supply chain.

Level IV: Data and processes are shared internally and externally.

We formulate different hypotheses, which are based on our conceptual model. An empirical study was conducted to verify these hypotheses:

- companies with mature business processes have lower inventory levels;
- companies that only invest in business processes do not tap the full potential;
- improvements in delivery performance demand IT investments;
- best-in-class-systems (BICS) companies with mature processes achieve superior financial performance;
- investing only in IT infrastructure leads to inefficiencies.

5 Empirical study

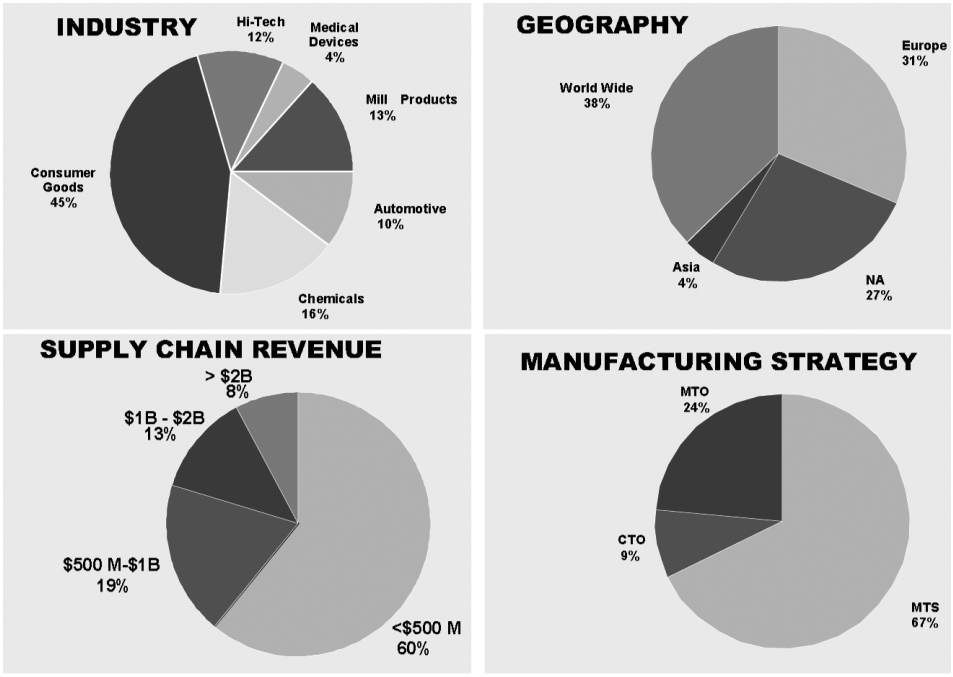
5.1 Introduction

To characterise the linkage between supply chain performance and the maturity of business processes and IT infrastructure, the research team collected and analysed data from 60 companies providing detailed non-disclosure information on 68 different supply chains. A total of 240 companies were asked to participate. Some did not answer at all, while others dropped out during the collection of data. In Figure 1, the distribution of the supply chains by industry, geography, supply chain revenue and manufacturing strategy, i.e. make-to-order (MTO), make-to-stock (MTS) and configure-to-order (CTO), is provided. As can be seen, about 45% of the companies are in consumer goods, 38% operate globally, 67% have an MTS manufacturing environment and 60% have revenue generated by the supply chain of not more than $500M.

The team collected data from the various supply chains by sending questionnaires focusing on supply chain planning processes and systems. We applied the SCOR model to assess the current state of a supply chain's business processes. In this model different planning areas are evaluated.

For each planning area we identified both systems and processes according to the maturity level defined in the previous section. The different levels of maturity were determined from a qualitative business process assessment that uses a questionnaire with different questions that characterise supply chain practices in the four areas of the SCORE model: plan, source, make and deliver. These areas are further broken down with multiple-choice answers to cover the following planning areas: supply chain design, demand planning, supply planning, demand-supply balancing, plan source, plan make and plan deliver. Similarly, the categories of IT systems are assessed by a multiple-choice questionnaire. As an example, we take one of the many questions and the corresponding multiple-choice answers for the IT systems support of demand-supply balancing.

Figure 1 Demographic information



The systems that integrate demand and supply information are best described as:

1 individual, non-integrated planning tools

2 integrated forecasting and supply chain planning systems

3 event-based exception management tools that highlight unbalanced improvement opportunities

4 exchange-based software balances and optimises demand and supply across the extended supply chain.

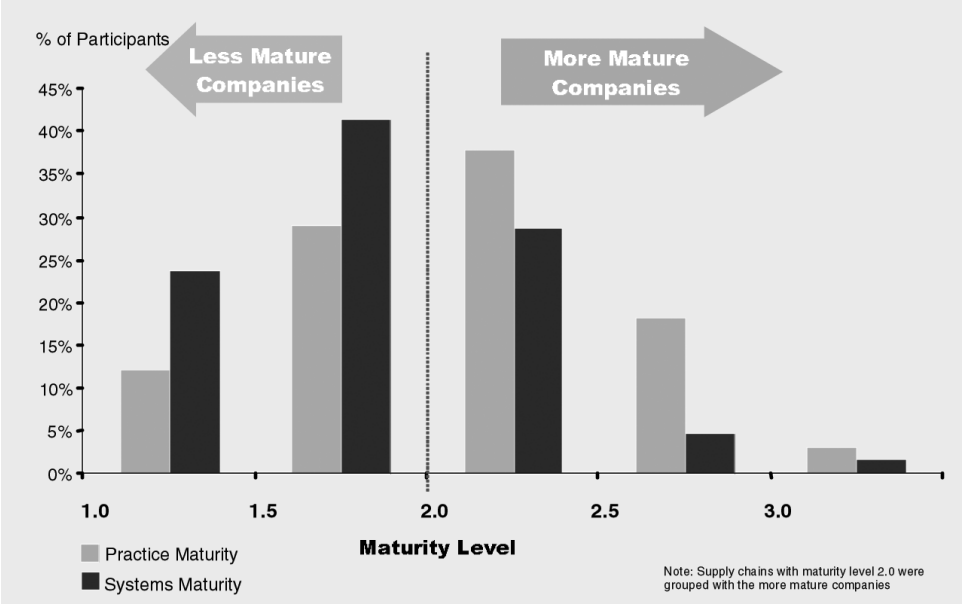
Each answer choice is designed to indicate that the practice is associated with a specific stage of capability. This way, companies characterise the maturity of their business practices and supporting IT systems.

Specifically, we used the data collected from the 68 supply chains to determine the maturity of processes and systems along each of the seven planning areas. Thus, the maturity of a supply chain business process is determined as the average of the seven scores on each of the planning areas. Consequently, the business process maturity level of a supply chain is a number between 1 and 4. A supply chain's system maturity is determined in the same way.

The distribution of maturity levels for processes and IT systems across the 68 supply chains is shown in Figure 2. There are more supply chains that have higher process maturity than systems maturity in our database. For instance, there are more companies with process maturity level above 2 than companies with an IT maturity level > 2. We refer to a company as having mature business processes (IT systems, respectively) if

its business process (IT system) maturity level is at least 2. Finally, we define BICS to be the top 20% IT mature supply chains, that is, these are the 20% of the supply chains with the top system maturity level. Of course, not all of those have mature business processes.

Figure 2 Distribution of processes and systems maturity among 75 supply chains



5.2 Descriptive results of the empirical study

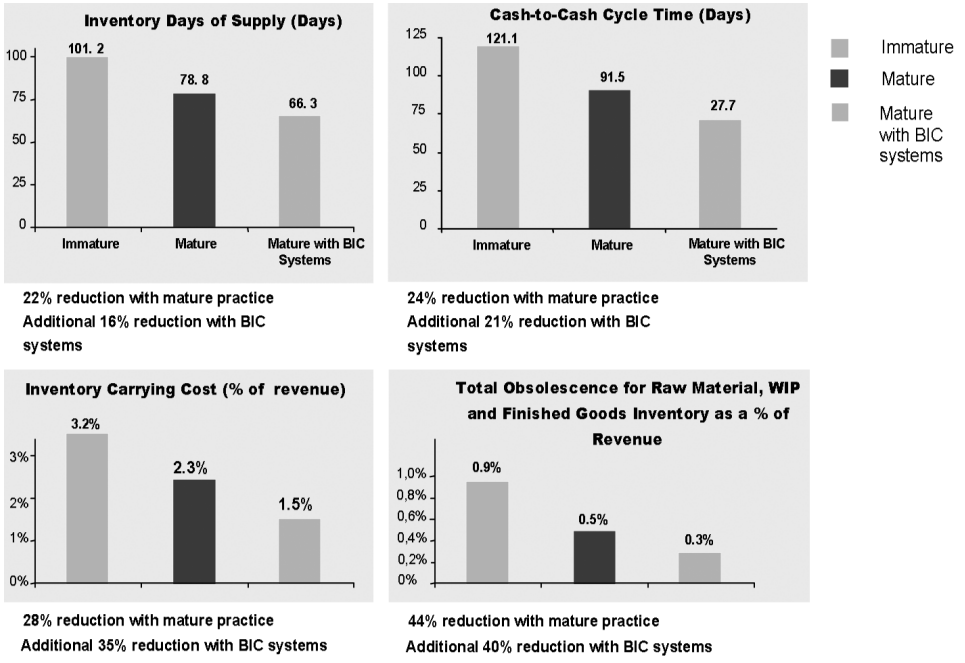
The benchmarking study is a powerful tool to identify the impact of processes and systems on supply chain performance. It helped not only to identify best practice but also to quantify their impact. The key findings can be reported as follows.

Companies with mature business processes have lower inventory levels: In Figure 3, it is suggested that companies with mature business processes have reduced the number of inventory days of supply, cash-to-cash cycle time, inventory carrying cost and total obsolescence cost, measured as a percentage of revenue. For instance, the average inventory carrying cost for business process mature companies is 28% lower than that of immature companies, i.e. companies whose process maturity index is below 2. Furthermore, process mature companies with top systems performance, i.e. BICS companies that are process mature, were able to reduce inventory carrying costs by another 35%. This leads to the second key finding.

Companies that only invest in business processes do not tap the full potential: Our study suggests that the right balance between processes and IT enables supply chains to reach the best performance. Indeed, for most performance measures considered, roughly half of the performance improvement stems from advancing the business process to a higher stage of maturity. The other half of the gain in performance is only realised by using mature IT systems. For example, consider Figure 3 again and observe that for each

measure of performance, BICS companies that are process mature have improved compared with the process mature companies. Similar results are obtained for performance measures such as on time delivery, fill rate level and order fulfilment lead time (see Figure 4). For example, companies with mature supply chain planning processes benefit 11% more from on-time delivery performance than companies with immature supply chain planning processes. BICS companies that are process mature enjoy another 6% increase in on time delivery.

Figure 3 Mature process companies have improved on inventory performance; BICS companies that are process mature perform even better



Improvements in delivery performance demand IT investments: Consider fill rate levels (see Figure 4). Process mature companies have on average a 6% higher fill rate than immature companies. However, BICS companies that are process mature have a 31% higher fill rate than process mature companies. This implies that IT infrastructure provides a huge competitive advantage with respect to fill rates. To obtain a better insight into this finding, consider a participant in the research, a global toys producer that faces thousands of order entries a minute during the high season of its business, the fourth quarter. Each order has to be allocated to the right warehouse and product substitution has to be taken into account. This environment demands a significant investment in IT infrastructure to provide the appropriate level of fill rate.

BICS companies with mature processes achieve superior financial performance: One of the most important findings of our study underscores the importance of investments both in systems and processes. Indeed, in Figure 5, it is shown that companies with mature business processes and best in class IT systems have on average a 14% net profit compared with an 8% market average, i.e. they have a 75% higher profitability.

Interestingly, this result is in agreement with the recent results of a benchmarking study conducted by Deloitte (2003). The key difference between our findings and those of Deloitte (2003) is that we directly relate the financial performance to both systems and process investments. Finally, our study indicates that only 10% of the surveyed companies fall in that category. These companies are BICS companies with mature business processes.

Figure 4 Delivery performance

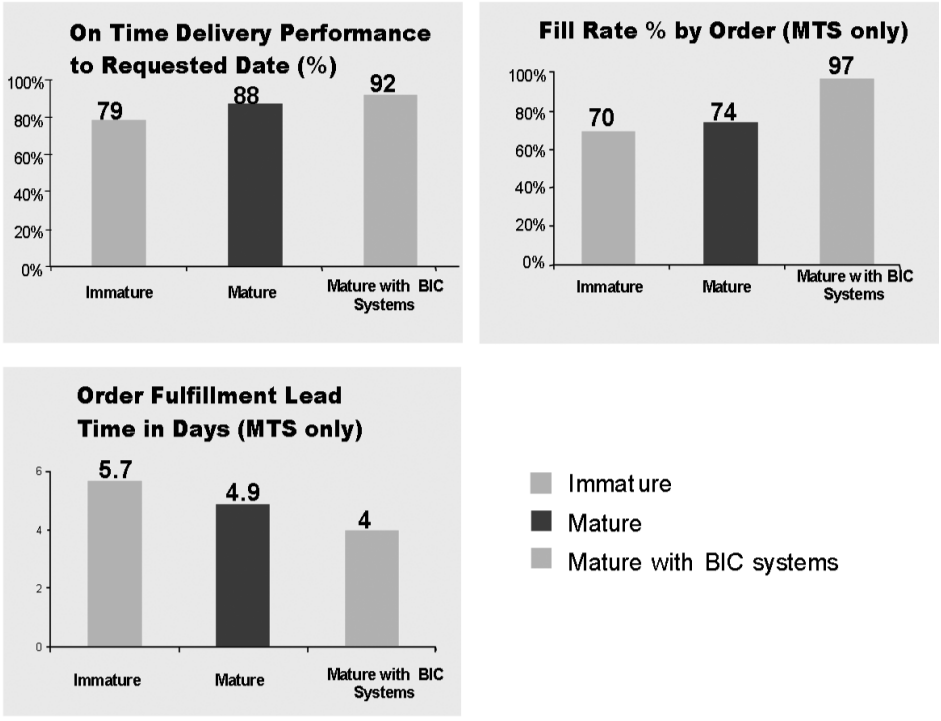
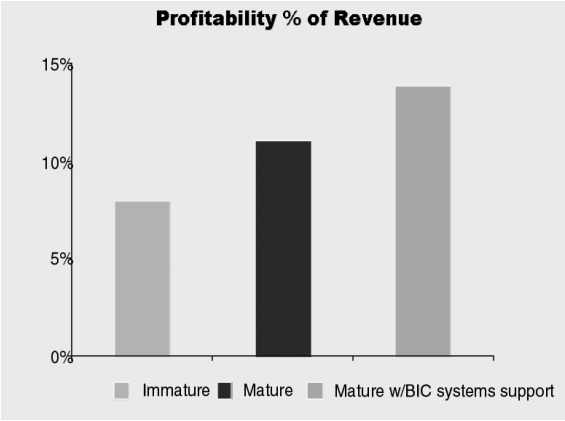
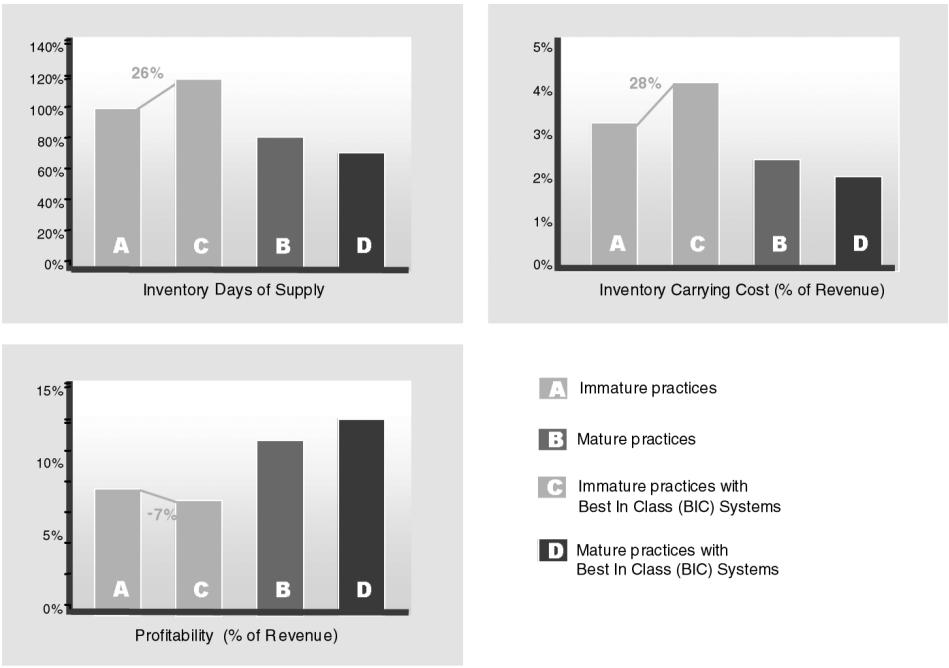


Figure 5 Financial performance



Investing only in IT infrastructure leads to inefficiencies. One of the most surprising findings of our study is that, companies who have invested only in IT infrastructure but not in supporting business processes suffer inefficiencies (see Figure 6). As the figure indicates, BICS companies, i.e. the top 20% IT mature companies, which are process immature, have a higher day of supply level, higher inventory carrying costs and lower profit than process immature companies that did not invest in IT infrastructure. For instance, BICS companies with immature business processes have a 26% higher inventory days of supply level, 28% higher inventory carrying costs and 7% lower average profit. The bottom line seems to be just implementing IT systems without supporting business processes is a waste of money.

Figure 6 Impact of investment in IT infrastructure



5.3 Further analysis and interpretation

The previous results can be nicely summarised in Figure 7. The vertical axis provides information about the maturity level of the business processes while the horizontal axis provides information on the maturity level of the IT systems. We partition the region spanned by the two dimensions into four boxes.

Quadrant A represents companies (or more precisely, supply chains) that are characterised by immature business processes and IT systems. Our data suggest that these supply chains suffer from a business performance below average. This includes high inventory levels, high cash-to-cash cycle time and low profitability to give a few examples.

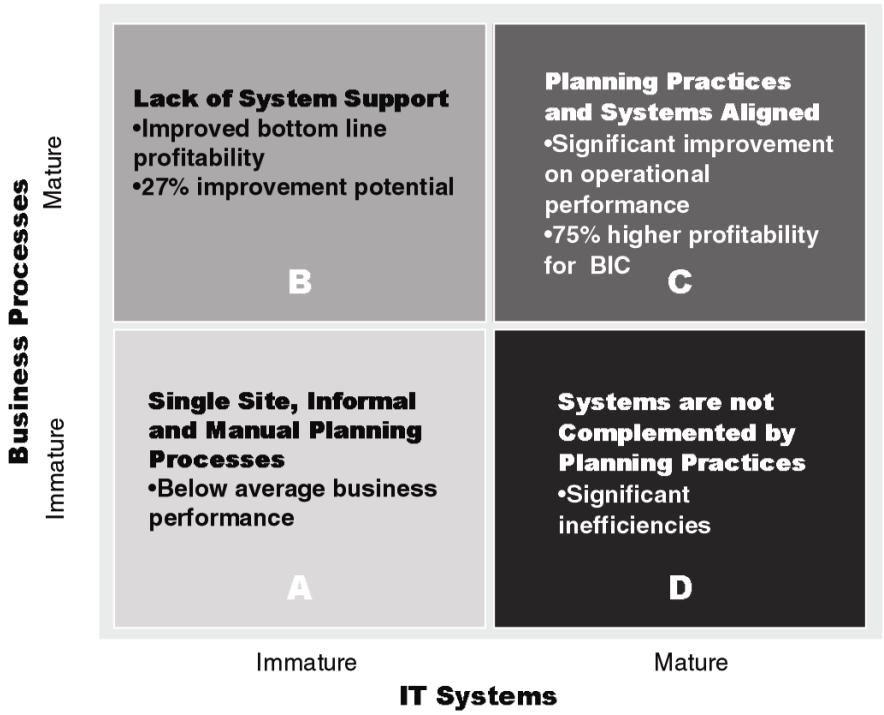
Quadrant B represents supply chains with mature business processes and immature systems. Companies in this category perform better than those who do not invest in either

processes or systems, but they leave a lot on the table. Specifically, our data suggest that these supply chains can increase profit (measured as a percentage of revenue) by 27% on average by investing in IT, that is, by transferring their IT systems through the stages of excellence to become mature systems. Obviously, such an investment in IT may require adjusting the business processes.

Quadrant C represents supply chains with mature systems and processes. These supply chains enjoy improvements in operational performance. More importantly, supply chain leaders, that is, supply chains that have mature processes and are BICS, i.e. those that are in the top 20% of IT maturity, enjoy 75% higher profit relative to other companies.

Finally, *Quadrant D* represents supply chains with mature IT systems but not processes. Surprisingly, our data show that these companies perform even worse than those with immature systems and processes. This, of course, requires a more careful analysis.

Figure 7 Linking processes and systems with operational and financial performance



Everything else being equal, one would expect that higher maturity level of the firm's IT systems would yield higher supply chain performance. Our data suggest that this is not the case. It seems that it is important to have a balanced system – a set of practices that fit with each other and with the supporting IT system. IT provides only information; without a process that can effectively transform information into knowledge and decisions, the supply chain will react to this vast amount of data greedily, generating an ineffective strategy. Although the traditional organisation is not as effective as the digital

organisation, at least the traditional organisation is coherent – all the pieces fit together and work. Apparently the worst thing is to take some pieces of the new system and some pieces of the old system and try to have a mongrel system where the pieces do not fit together very well.

Distribution of companies in the four quadrants of Figure 7:

- Quadrant C: mature companies with BIC systems: 10%
- Quadrant D: immature companies with BIC systems: 9%
- Quadrant B: mature companies with 'no-BIC' systems: 46%
- Quadrant A: immature companies with 'non-BIC' systems: 35.

Reading these percentages, one has to bear in mind that the analysis splits the quadrants based on BIC/non-BIC systems as opposed to mature/immature systems. Therefore, for example,s 10% of the mature companies with the BIC systems is only a part of the quadrant C. There are, of course, also those companies in quadrant C that have mature processes, but not BIC systems support, i.e. average mature systems support.

The insight generated so far has important implications for new and exciting technologies such as radio frequency identification (RFID) (Fleisch and Tellkamp, 2005). Supply chain pundits and consultants like to use the phrase 'RFID provides the ultimate demand signal'. We do not dispute this idea, but we point out an important caveat suggested by our analysis. Without complementing RFID with the appropriate business process designed specifically for a particular supply chain, it is not likely that the company will benefit from the technology and in fact it may face negative returns on investment. The appropriate business process is of course directly related to the firm's long-term strategy and business objective.

5.4 Results of statistical tests

The results of tests for mean differences of selected indicators which are based on the mean values for each group are reported in Table 2 (overall process mature companies, overall process immature companies, process mature with BICS companies, process immature with BICS companies, see also Table 1).

Table 1 Population size

Group	*Number of companies per group*
Overall process mature	38
Overall process immature	30
Process mature with BIC	7
Process immature with BIC	6

Tests for equal sample variances confirmed that the sample variances are not equal. Hence, results are reported assuming unequal variances. Significant differences (statistics significant at 0.1 level – two-tailed) were only found between process immature and

process mature companies on cash-to-cash cycle time. The other results are not statistically significant. A further problem is the small sample size. In general, the above described results (Section 5.2) provide additional insight, although some of the results are not statistically significant (Table 2).

Small sample size is typically the trade-off for analysing non-disclosure data. One has to get the permission and collaboration of each participating entity for the study (privately owned companies, divisions within big corporations that do not publish their data, etc.). Naturally this leads to smaller sample sizes than when analysing publicly available data.

Table 2 Overall process mature versus overall process immature companies – selected indicators

Indicator	*Mean immature*	*Mean mature*	*Difference in mean*	*p-value*
Inventory days of supply	101.2	78.8	–22.4	0.1024
Cash-to-cash cycle time (days)	121.1	91.5	–29.6	0.0802
Delivery performance to request	79%	88%	9%	0.186
Profitability % of revenue	8%	11%	3%	0.2606
Obsolescence	0.9%	0.5%	–0.4%	0.1978
Inventory-carrying costs	3.2%	2.3%	–0.9%	0.1145

6 Conclusion

Much of the current interest in SCM is motivated by the possibilities that are introduced by the abundance of data through the pervasiveness of IT systems and most recently RFID. Indeed, many analysts have argued that for many firms, IT provides a competitive advantage. This, however, raises an important question. If IT infrastructure and hence data are so important, what inhibits other firms from adopting the same technology? Put differently, now that IT infrastructure has been established, companies cannot achieve a sustainable competitive advantage through IT as their competitor can apply these as well no matter which technology is used (Carr, 2003).

Our research suggests that sustainable competitive advantage is not achieved through IT alone but rather through the combination of IT and effective business processes.

Specifically, our results show that companies with best-in-class (BIC) IT systems that do not apply the corresponding BIC business processes not only have 7% lower profitability (EBIT as percent of revenue) than their peers with traditional organisation and no IT systems support but also a lower supply chain performance, e.g. 26% longer inventory days of supply and 28% higher inventory-carrying costs. Thus, these companies not only waste their money on IT investments but even slow down their value chain.

Our empirical data and recent MIT results (Brynjolfsson and Yang, 2003) suggest that technology alone, and in particular, IT systems alone do not provide any competitive advantage and in fact can lead to negative performance. What makes a difference and provides a competitive advantage is the business processes developed to support the

company's strategic goals. These business processes transform information into knowledge that enables the company to perform effectively and make various decisions from strategic to operational.

Reiner and Hofmann (2004) analysed the present data set further using an efficiency analysis (DEA). The results show that productivity analysis can be applied to explain why some of the analysed companies are able to transform their operational efficiency into higher profitability. They also identified improvement potentials for the benchmarked companies and found that pooling methods such as central warehousing are successfully applied across most of the companies.

Moreover, our study shows that only a fraction of today's supply chains are managed effectively. Only 10% of the companies that took part in the study are able to transform their value chain efficiencies into bottom line profit. They show a 75% higher profitability than their immature – in business processes as well as IT systems support – peers. One of the reasons is the mounting challenges they have to face nowadays. These include globalisation, outsourcing, a considerable increase in supply and demand uncertainties, more products with short life cycles and the proliferation of products in today's markets. There is no single and simple answer to these challenges as business processes not only vary from industry to industry but also vary between companies within the same industry. Even companies within the same industry typically have different business strategies depending on their emphasis of dimensions such as price, product variety, service time to end consumer, etc. (Simchi-Levi et al., 2004).

This paper would be incomplete if we did not mention important limitations of our analysis. Firstly, our focus in this paper has been on the impact of investments in IT and business processes on supply chain performance. Of course, another important dimension that needs to be considered is the organisational structure and its ability to complement and support supply chain objectives, processes and technology. Secondly, our analysis of the impact of IT and business processes on the financial bottom line is not conclusive. Indeed, to be conclusive, additional information on supply chain performance before and after implementing the technology is needed. It is encouraging to see the direct relationship between the enablers and financial performance, but it is not clear what comes first. Was technology implemented prior to achieving significant profit or perhaps after? Therefore, further research activities will address these topics.

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