

The Profitability Puzzle: Integrating Sales and Product Development Improves Management's Ability to Control Future Profitability

Christopher R. Schmidt

University of Pécs, Pécs, Hungary

Ferenc Farkas

University of Pécs, Pécs, Hungary

Abstract

Manufacturers today have sales teams that span the globe and are negotiating contracts today that will constitute the firm's forward revenue stream, and profitability, for the next decade. Meanwhile, even larger teams of engineers and designers are working in product development refining and changing the product design that was specified in the contract. Controlling the profitability of hundreds of time-varying customer contracts, on a global basis, for products that are years away from production, and whose pricing and cost parameters are in constant flux, is a significant challenge inside the global manufacturer. This complex "Profitability Puzzle" of maintaining accurate profitability estimates for several years prior to production is an integration task that firms Enterprise Resource Planning (ERP) implementations fall short of. The integration of Product Lifecycle Management (PLM), Sales Forecasting, Cost Estimating and Quoting and Enterprise Resource Planning (ERP) applications now allows global manufacturers to solve the Profitability Puzzle and tightly control the profitability of their future product pipeline. Evidence is presented that integrating the strategic planning process with the sales and the product development disciplines can help manufacturers achieve higher returns. Market valuations of publicly listed global manufacturers that are known to have pursued the integration of long-term strategic planning with operational information are compared to their peers. Although the sample set is small, evidence suggests that implementers of these integration projects return far greater valuation growth than their competitors.

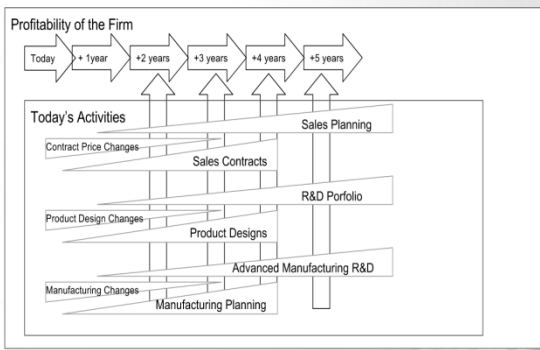
Keywords

Controlling, profitability controlling, product lifecycle management, PLM, ERP, manufacturing, product development.

Introduction

Global manufacturers engaged in product spaces with long design cycles (2-3 years) such as the automotive industry, have thousands of highly educated knowledge workers actively engaged in the processes of product design and sales contracts that will constitute the firm's forward revenue stream, and profitability, for the next decade. Manufacturers have long been provided far more services and value-add than just "building" or producing a final product and now with the preva-

lence of outsourced production in low-cost countries, product design and development functions bear a more significant portion of the manufacturer's direct cost of a product. Further, the design and development functions are processes that happen years before the first product starts production. Understanding costs and negotiating profitability years in advance has been a persistent challenge to these industries and constitutes what this paper calls "The Profitability Puzzle" as represented visually in picture 1.



Picture 1 Today's Functional Activities Define the Firms Future Profitability
Source: The authors

The firm must record and maintain the information related to all transactions, negotiations, and agreements that impact customer agreements. This process of recording, analyzing and archiving this must include all product design changes handled by the Product Development area, all changes in the manufacturing processes, and all changes in procurement and finance assumptions. Capturing all of this information across large global cross-sections of functional areas is an integration task that firms ERP system fall short of - causing organisations to revert to manual processes and oversimplifications. Firms that are global in scope and provide high complexity product and service portfolios to hundreds of multinational customers often struggle to understand with sufficient accuracy, the sheer number of products being developed and produced, are missing accurate and timely life-cycle plans, and in some cases have inconsistent or missing profitability targets for their business contracts. Systems used in the Product Development area such as Product Lifecycle Management (PLM) tools which contain product and process designs that make up the future product portfolio, along with current product change information critical in the Cost Estimating process, can now be integrated with the product pricing information contained in the Sales organization. The Sales Organization focuses on preparing, monitoring, and controlling Pricing Quoting processes and integrating them into the Strategic Planning and Sales Forecasting processes for the long term and with the Enterprise Resource Planning (ERP) system for the short term now allows manufacturers to tightly control the profitability of their future product pipeline.

The ability to capture strategic plans in an integrated fashion and monitor their profitability throughout the manufacturing lifetime has impor-

tance which extends to the national and global level, as Pisano & Shih (2009), who argue that if America, or any nation, wants to undertake a strategic improvement initiative in the fundamental competitiveness, it must be based in the areas of research and development. This focus on the importance of research and development reinforces the importance of efficiency and expertise in the areas of product development and long-range planning that are crucial, as are the tools that will automate and streamline these processes. Pisano & Shih emphasize this through the counterpoint of the loss of these capabilities with the actual example and trend that first manufacturing was moved offshore and the engineering and design know-how soon followed, resulting in the loss of the full competency and competitiveness. Government and industry must partner together to re-establish these competencies, establishing manufacturing and technology "hubs" which they call "commons" as an essential strategic component. Pisano and Shih point out that universities can be centres of these initiatives such as Stanford and UC Berkeley have demonstrated, and an effective conduit for government funding to support such "commons". This is the basis for a new national industrial policy which has gained real traction in entrepreneurial veins. Dobrai and Farkas (2009) look at knowledge intensive organizations and processes of the modern economy and emphasize the importance of the capture, share, and transfer of knowledge throughout the larger enterprise. Further, working with Poor et al. (2014) the fundamental challenges that are facing multinationals with the skill and human resource development challenges in Central and Eastern Europe, the importance of knowledge transfer support technology is essential.

In line with Pisano and Shih (2009), Porter & Rivkin (2012) also talk about macro perspectives influencing the foundation of a nation's competitiveness and ultimately its potential for growth or decline. They look specifically at the US and use several sources, including a Harvard Business School survey of 10,000 alumni, where 71% of the respondents felt that the US was weakening as a marketplace. Porter and Rivkin cite a complex combination of indicators of the decline: Manager's outlook (negative), Productivity trends (stalled or declining), Wage trends (stagnant with substantial disparity), and international trade and investment (falling FDI). They also present the causes of the declining influence and competitiveness: competition from emerging markets and

transition economies, short-term focus of government and corporations; wage disparity and the struggle to replace outsourced manufacturing jobs with higher value-add activities; weakened government through excessive debt, ineffective tax codes, and inability to focus on long-term investment; and finally the vicious circles of reinforced decline that each of these causes generate as their effects are combined. It is essential for firms when trying to reverse declining productivity and wage trends to identify higher value-add activities in a well-planned long-term research and development and business portfolio. Integrated long-term profitability planning that forces executives and staffs to look 5 and 10 years into the future is a prerequisite to being able to achieve these challenging goals.

Hammer (2004) in "Deep Change" argues for the benefits of transformative internal change that ERP, CRM, and SCM technologies can deliver. This paper takes things one step further, where ERP typically means "integrated finance and inventory systems, including orders, invoicing, payments, and deliver" and CRM means "keeping track of customer contact information and standardizes customer relations" and SCM focuses on supply chain management and systemic inventory efficiencies, nowhere is the topic of integrated planning and product development discussed. This is the new realm of integrated Planning and Product Development technologies.

Fisher (1997) looks at the benefits of understanding the customer's demand model and matching the supply chain accordingly. Creating a categorization of product lifecycle (short or long) and supply chains (responsive or efficient) he presents examples of where optimizing or matching of customer demand to the supply chain, and vice versa matching the supply chain to the customer demand can eliminate efficiencies. The case of Campbell's soup promotional policy disrupting their efficient supply chain was discussed as well as the case of Sport Obermeyer's apparel business where cycles of overproduction and underproduction were minimized by an optimizing ordering and demand forecasting via a consensus forecast. Better long-term planning and more accurate demand forecasting can drive efficiencies in both the supply chain and capacity planning. Savings can be found in early, timely sourcing decisions, timely warning on capacity utilization issues - allowing for timely construction of new facilities, or consolidation of production in specific regions. In an earlier paper published together with Walter

Obermeyer of Sport Obermeyer, Fisher, Hammond, Obermeyer and Raman (1994) describe the operational benefits of accurate demand planning in their analysis of the apparel producer Sport Obermeyer. Sport Obermeyer was able to make refinements in their consensus forecasting process to provide substantial operational benefits, including a better match of supply to demand, minimizing or optimizing excess inventories, and better meeting customers' style and colour needs by adapting production and planning dynamically and where possible, in real time.

Automotive suppliers, computer, and cell phone manufacturers, spend as much or more time designing and developing their products than actually manufacturing them. These companies are all enormous and long-lived, having amassed substantial assets and, as discussed by Collis and Montgomery (2008), have specific strategic competitive advantages, supporting the concept of path dependency to explain the accumulated mass of unique capabilities and resources that these firms can offer. Collis and Montgomery (2008) describe the 5 characteristics of the historically competitively valuable advantages:

1. Difficult to copy
2. Depreciate slowly
3. Your company – not employees, customers or suppliers – controls their value
4. Can't be easily substituted
5. Superior to similar resources your competitors own

Several, or all, of these historical competitive advantages are under greater threat for global long-lived manufacturers, as the speed of technology is destroying barriers to entry and products and processes are ever easier to copy, greatly accelerating the rate of depreciation, can often be easily substituted, with employee bases that are highly mobile and transient, it is ever more challenging to show superior resources. Better efficiency and planning enabled by integration technologies in the product development area is a key strength that can be a differentiator. With a consolidated and more standardized supply base, weaknesses in these areas can lead to enormous liability via mass recall actions due to poor design, development, or manufacture, as discussed in Roland Berger Lazard's 2013 Global Automotive Supplier Study (Roland Berger, Lazard, 2013).

1. The profitability puzzle

1.1. Strategic planning

In an MIT working paper, Bitran and Tirupati (1989) identify the first step in the process of Product Planning as Strategic Planning in which they identify the importance of long-term planning and executive decision making. Kaplan & Norton (1995) argue, as is a common and widespread criticism of the American enterprise that management has focused solely on stock-market quarterly earnings performance – very short near-term performance, and have overlooked long-term performance. This trend has reversed itself in a few manufacturers who are the subject of this study, and have invested in technologies to better understand the long-term profitability of their enterprise in a fashion that is commensurate with the best-practicable technologies today, and are using those tools to outperform the market.

Hayes and Pisano (1994) in their article “Beyond World Class” argue that firms need flexibility in their strategies in order to stay relevant in turbulent environments, and absolutely need to go beyond the “best practice” copycat strategies that were pervasive in the ‘80s. Hayes-Pisano argues that identifying strategic capabilities is a key shift that firms need to make that will affect all operational decisions. Decisions such as outsourcing, offshoring, and investing in new capabilities are now framed as enabling and improving strategic capabilities. This lays the foundation for Pisano and Shih’s later works discussed earlier, where this lack of strategic planning has resulted in the disappearance of certain strategic capabilities from developed nations such as the US. This strategic planning and monitoring of key capabilities is where the integration of long-term forecasting tools and product development systems are used to capture more scenarios, more simulations, and more variations of outcomes, enabling better strategic decision making.

Vörös (2006) and other papers focus on the analysis of Total Quality Management (TQM) and show strong respect and interest in the Toyota success in exceptional quality and exceptional profitability. What is less often discussed is the strategic plan and leadership that drives the deliberate growth of Toyota from a domestic manufacturer of excellent quality and profitability into a global leader in all markets and segments. This strategic direction was not only employed by Toyota and Honda, but most recently by South Korean Chaebol, which have challenged the Japa-

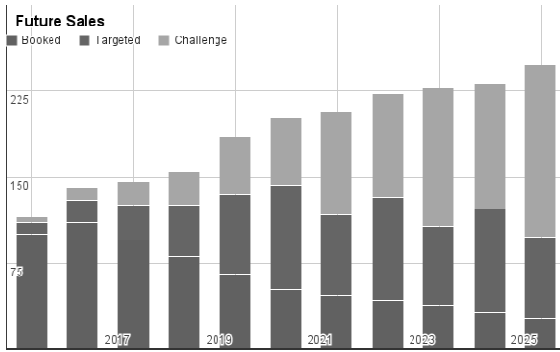
nese dominance driven by strong strategic growth plan and global expansion. Excellent quality and efficiency in itself do not make a global leader; growth on a global scale in these institutions was driven, planned and executed on.

Kaplan & Norton (2008) discuss a closed loop system to link strategy and operations, and the importance of maintaining a strategic focus. They define a multi-stage closed loop system and 4 perspectives of strategy as critical components of management discipline to maintain the strategic link to operations. The stages of the closed loop are defined as: develop the strategy, translate the strategy, plan operations, execute, monitor & learn, and adapt the strategy. The four perspectives are defined as: learning and growth perspective, process perspective, customer perspective and the financial perspective. In addition to the implementation tools provided in the article to help managers implement the closed loop approach, technology can and must assist in quantifying, monitoring and controlling the anticipated value add of all of the strategic and tactical actions, and ensure that their cumulative value will fulfil the long-term profitability goals of the enterprise.

Once long-term strategy has been determined, management focus must turn to execution – pursuing sales, contracting with customers, executing on the design and manufacturing processes the end products. This is where the dynamics of controlling are essential.

1.2. The dynamic mechanism of controlling forward profitability

The numerous challenges of planning, calculating, and controlling future profitability are predicated upon the critical topic of strategic planning. Once strategy is defined, strategies and tactics can be captured into financial models of the firm. The strategic plan provides management with clearly actionable and assigned responsibilities for achieving specific targets which must be quantified. These actions make up the future sales and profitability growth plan of the enterprise, which is shown in Picture 2 and shows the difference between what is known as existing “Booked” business, “Targeted” likely growth business, and “Challenge” which constitutes new segments, new conquests with higher risk and uncertainty, capturing and quantifying the results of the strategic plan.



Picture 2 Future Sales Pipeline by Confidence
Source: The authors

This initial financial model of the strategic plan and tactics constitutes a static model of profitability until the point of execution and the monitoring and controlling phase of execution is achieved. As implementation and execution of tactics begins, the dynamic process of implementing and controlling forward profitability on a regular, timely basis follows. Picture 3 shows the evolution of the level of activity over the course of the product development cycle, which can span decades, and consists the entire lifecycle of the product that is to be analyzed and monitored as a component of the firm's future profitability model.



Picture 3 Learning Curve of Profitability Controlling
Source: The authors

The calculation of forward profitability relies on the proper calculation of cost measures which are in constant flux in the years and months that separate the initial contract award date and the actual start of production and delivery of goods. Once the Revenue Forecast scenarios are built, and macro overlays are established which reflect the business cycle and monetary and tax policies of national markets, and the entire portfolio of individual national business cycles are integrated into the long-term profitability plan of the forward thinking manufacturer. Secondly the product costs, direct product costs and overhead general and administrative expenses are incorporated. This is a substantial exercise inside of the multinational that consumes significant resources when not automated or inaccuracies when abstractions are made to allow manual processes to capture complex activities. Often the product view of

profitability is lost and obscured in these aggregations, leaving management challenged to know the true current profitability of any given product.

Once the static model is completed, it is, perhaps even before completion, out-of-date and full of inaccuracies. Causes for this are the following:

- Changes in Revenue related contracts
- Changes in volumes
- Changes in cost side measures (manufacturing cost, product design, raw material, labour costs, overhead changes)

And where these changes have occurred, tracking and capturing them for future periods - such as by year for the next 5 to 10 years, is an expertise and capability that few firms have undertaken. Some of the elements that are required to maintain the dynamic, integrated long-term profitability model are:

- Pricing and Discount Changes, Amendments, Wins and Losses in Revenue related contracts
- Changes in volumes of actual contracts over the long term forecast period
- Changes in cost side measures (manufacturing cost, product design, raw material, labour costs, overhead changes)
- Plant process change information
- Product change information
- Raw material economics and changes
- Labour and Overhead long-term models

In the case of the global durable goods manufacturer, with a presence in many nations and numerous facilities per country, each with its own teams of sales and engineering staff, it is a monumental task to accumulate the values contained in sales contracts, product designs and definitions, manufacturing processes and definitions. Capturing and aggregating this information has been the domain of the traditional ERP application and almost always focusing on managing business for the current year, and focusing on location and tax jurisdiction level financial reporting.

2. Evidence that integration improves returns

In a forthcoming publication by CIMData, data shows that one global manufacturer included in this study closed the repeatable gap on sales forecast variance by a factor of 5 from 10% to 2%. This improvement in accuracy helps improve the

firm's performance, provides management a much more reliable picture of sales performance, and allows them to take action where necessary, and was previously not possible, for the 8% of the business that was inaccurately forecast previously.

In the Harvard Case Study "Scharffen Berger" Snow, Wheelwright and Wagonfeld (2005), the example of capacity optimization is an exercise entirely based on the anticipated future growth in product demand. The certainty and level of product and customer detail on how that growth would be achieved is something that would certainly help in the determination of the appropriate level of investment required to meet future demand, especially if the demand growth was anticipated to be sustainable the longer term, or not - would be crucial information in the capital allocation process.

Focusing on the financial benefits of improved operations after a sales contract has been awarded and long after a product has been designed and the manufacturing process defined is the focus of Hendricks and Singhal (1997) who studied the financial benefit of TQM programs using stock market returns and varied windows of performance to identify evidence of improvement in financial returns. The execution of firm and its efficiency at fulfilling the completed contract has been the primary focus of many similar efforts, as cited by Hendricks & Singhal, and they show that focusing on total quality and efficiency initiatives provide clear operational and financial benefits. In the following sections, I use a similar approach to find evidence that firms that have invested in and implemented Future Profitability Management (FPM) technologies are performing better than their peers and the marketplace, by enabling management and the firm to work more efficiently upstream from the manufacturing process by better managing the sales portfolio and analyzing profitability at the micro- level, years in advance.

Data from seven global automotive parts suppliers that are known to have pursued technology projects that focused on integrating data from sales and product development into their financial planning and modelling is reviewed to see if these projects have provided financial performance advantages when compared to their peers. For this analysis, the long-term financial performance and the market value of the firms is estimated via data that is publicly available from the leading stock exchanges. The seven firms under study and the approximate dates of their project starts are shown in Table 1.

Table 1 Publicly listed manufacturers and their Implementation dates

Manufacturer	Listing exchange	2013 Annual sales (millions) (1)	Market valuation (2)	Industry ranking (3)	Implementation quarter - year (4)
Firm "L"	Toronto SE	4,090	5,110	80	Q4 2011
Firm "D"	NYSE	6,660	3830	26	Q1 2010
Firm "M"	NYSE	862	1,500	n/a	Q2 2008
Firm "L"	NYSE	503	508	n/a	Q3 2006

Source: the authors based on Bloomberg L.P., 2016a, 2016b; Crain Communications, 2013

Of course implementation times and implementation rigor vary on each project; improvements are not instantaneous; nor is the implementation of such tools the only factor driving fluctuations in market value over time, or relative ranking in industry comparisons. This paper concedes that these implementations may be a proxy for intelligent management that is both aggressive about leveraging technology and insisting on a high value from their technology projects and firms.

2.1. Estimating changes in market capitalization

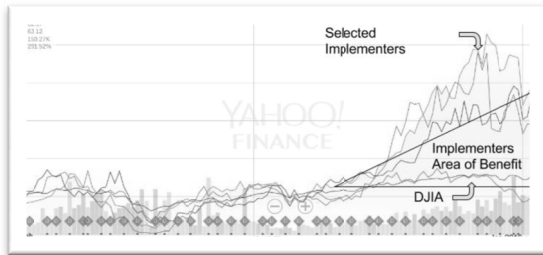
For the four firms considered in this study, where financial data was available, Table 2 shows that these firms have outperformed the NYSE/DJIA industry average over the last 10 years by nearly a factor of 3. The firm's estimated change in market capitalization since implementation start was a 217% increase, compared to the NYSE/DJIA 10 year performance of 66% growth.

Table 2 Publicly listed manufacturers and their Implementation dates

Manufacturer	Listing exchange	Implementation quarter - year	Implied Market Cap @ implementation	Market cap Jan 1, 2016	Change in Market Value
Firm "L"	Toronto SE	Q4 2011	\$1,077,480,000	\$3,505,924,620	374%
Firm "D"	NYSE	Q1 2010	\$1,926,010,615	\$2,038,630,400	99%
Firm "M"	NYSE	Q2 2008	\$428,407,353	\$1,170,880,360	250%
Firm "N"	NYSE	Q3 2006	\$190,411,436	\$607,346,640	183%
This Group - Average			\$578,347,615	\$1,830,695,505	217%
DJIA		Q2 2005	\$10,513	\$17,425	66%
Better than DJIA					151%

Source: the authors based on Bloomberg L.P., 2016b

Picture 4 below shows the 10 year relative price change trend for these selected firms graphically for the selected known implementers and compares them with the return of the industrial average.



Picture 4 Stock Performance Trend of Selected Implementers vs. DJIA

Source: the authors based on Yahoo Finance, 2016

This analysis of a small sample of firm's market capitalization and valuation indicates that the firms that have implemented projects to integrate sales and product development functions in order to better control forward profitability are outperforming their peers and the market. Comparatively the automotive parts sector tracked much lower performance over the same ten years, underperforming the NYSE/DJIA by about a half, increasing only 25% while these select advanced integrators had comparably stellar performance.

Conclusions

The integration of Product Lifecycle Management (PLM), Sales Forecasting, Cost Estimating and Quoting and Enterprise Resource Planning (ERP) applications now allows Firms which Globally Design and Manufacture Products (manufacturer's) to tightly control the profitability of their future product pipeline. Capturing the impact of customer agreements, design changes in the product or product manufacturing, and procurement, is an integration task that firms can implement, and when implemented, can provide significant operational profitability and market valuation improvements. This new approach to integration now allows the producers of high complexity products to create and maintain accurate and dynamic life-cycle plans, and firm profitability targets for all dimensions of their business. While project implementation times and implementation rigor vary and improvements are not instantaneous, clear long-term performance improvements have been achieved by firms that have pursued this integration strategy. This paper provides evidence that these implementations and the empha-

sis on better understanding future profitability, enables firms to deliver exceptional returns to investors. Understanding costs and negotiating profitability years in advance has been a persistent challenge to these industries for decades. Appendix A presents a self-assessment rubric that can be used to evaluate internal processes and readiness for adopting integrated forward profitability tools.

Opportunity for further research exists in the analysis of the relative performance of these implementers using changes in automotive supplier rankings to determine relative success and evidence that better integration, planning, and strategic execution constitute a competitive advantage which has enabled these firms to overtake their peers. Further analysis of the improvement of the firm's market share ratios over time may also show evidence of real competitive advantage that superior returns provide.

Appendix A: Forward Profitability Readiness Assessment

1. What level of detail do you currently use to support strategic long-range financial plans?

- Single, high level spreadsheet, prepared by one function only 1pt.
- Individual spreadsheets by each function 2pts.
- Each area has a planning database, but disconnected 3pts.
- Databases have product customer and regional details, but disconnected 4pts
- Single integrated system built on product integrated all functions 5pts.

2. How do you manage your sales team's plan and long-term growth?

- They are too busy handling quality problems to discuss planning 0pts.
- Single annual planning meeting via budget process for next year 1pt.
- Each individual has goals based on last year's sales 2pts.
- Sales goals are at product, region, and salesperson, reviewed quarterly 3pts.
- All goals and activity is monitored in CRM application 4pts.
- Sales and Product Development integrated in one live system 5pts.

3. How do you plan and track your market share?

- We are working to understand how much business our competitors have 1pt.
- Annual spreadsheet exercise 2pts.
- Integrated into budgeting and planning process 3pts.
- Tracking in our CRM 4pts
- Integrated live updates with sales and Knowledge Management tools 5pts

4. How do you calculate and manage future profitability?

- We have a budget for current year 1pt.
- We have a 3 year high-level plan by segment 2pts.
- Manual updates of actuals and re-forecast of 3yr plan 3pts.
- Monthly updates of actuals sales, no forward contract updates 4pts.

- Live integrated updates of actuals, forward contracts, forward costs 5pts.

Scoring:

0-10: Plan a priority project to integrate sales forecasting with quoting and pricing

11-17: Ready to move to the next level of integration: integrate costing and profitability

18-20: Focus on executing market share tracking and profitability growth management **SM**

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✉ Correspondence

Christopher R. Schmidt

University of Pécs
 Vasvári Pál utca 4, H-7622, Pécs, Hungary
 E-mail: schmidt.christopher@pte.hu