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To Build a Bridge: What Significance Does Complexity Management Have for Production?

Schuh & Company
Complexity Management

Content

Editorial

Building a bridge is a complex task; crossing rivers, withstanding heavy loads and rough winds, just to get the right "fit" within budget and finish the project by connecting both construction ends of the bridge.

Production departments in all industries face similar challenges, especially during uncertain times. The global "fit" of product and production needs to be right and costs have to be controlled. Complexity Management can help to achieve this task.

Discover in this issue the conclusions John Deere and Polydeck Screen Corporation recently made when they implemented strategic Complexity Management techniques.

Best regards,

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To Build a Bridge: What Significance Does Complexity Management Have for Production?

Gregor Tuecks

Today's production systems are complex and difficult. The variety and the dynamics within the systems, as well as the sheer amount of design parameters are just barely manageable. Especially when the product spectrum is very broad and profound and the production facilities located globally, most known optimization approaches fall short. These approaches usually miss the integrated view from market to product to production, and thus neglect the complexity and dynamics of the system.

When examining production plants, normally a multitude of procedural and structural deficits can be found. The problems manifest themselves in long lead times, poor internal and external delivery performance, too much inventory, and unit production costs that are too high. The occurrence of those deficits varies by industry. To circumvent them, the automotive industry introduced so-called "production systems", which claim to perfect production including all elements without waste. The first example that comes to mind is the "Toyota Production System". Other global corporations have used the same ideas and implemented them to fit their systems (e.g. MercedesBenz, Ford, Siemens). The majority of companies in other industries, (such as machine tool manufacturing and pharmaceutical), are currently just in the beginning stages of implementing such programs. However, these approaches often fall short of anticipated results because the complexities and dynamics of the systems are not captured. This article describes a universal framework with focus on the significance that

Complexity Management has in the production environment, showing how existing lean-approaches can be expanded to make them actually work.

Today's Production Systems Are too Complex

The cause for these symptoms lies often with the unmanageable complexity of a production system. The complexity is triggered by the variety, individualization, and market volatility where the products are offered. Furthermore, production systems rely on sub-systems that are hierarchically structured (Fig. 1). The production contains a variety of elements that are dependent and influence each other. Therefore, constant change is common within the production system. On the top level, a production system is described by its network and its (allocated) value creation. On the lowest level of the hierarchy are the single work places.

The configuration and mastery of the variety of different elements and their relationship require a holistic and system-oriented design approach within production environments. The advantages of a system approach comprise the description of sub-systems that reduce the complexity of the whole production without neglecting the interrelations between the different system elements. Schuh & Company utilizes the system theory of the St. Gallen Management Concept (Fig. 2), promoting a purposeful distinction between the normative, strategic, and

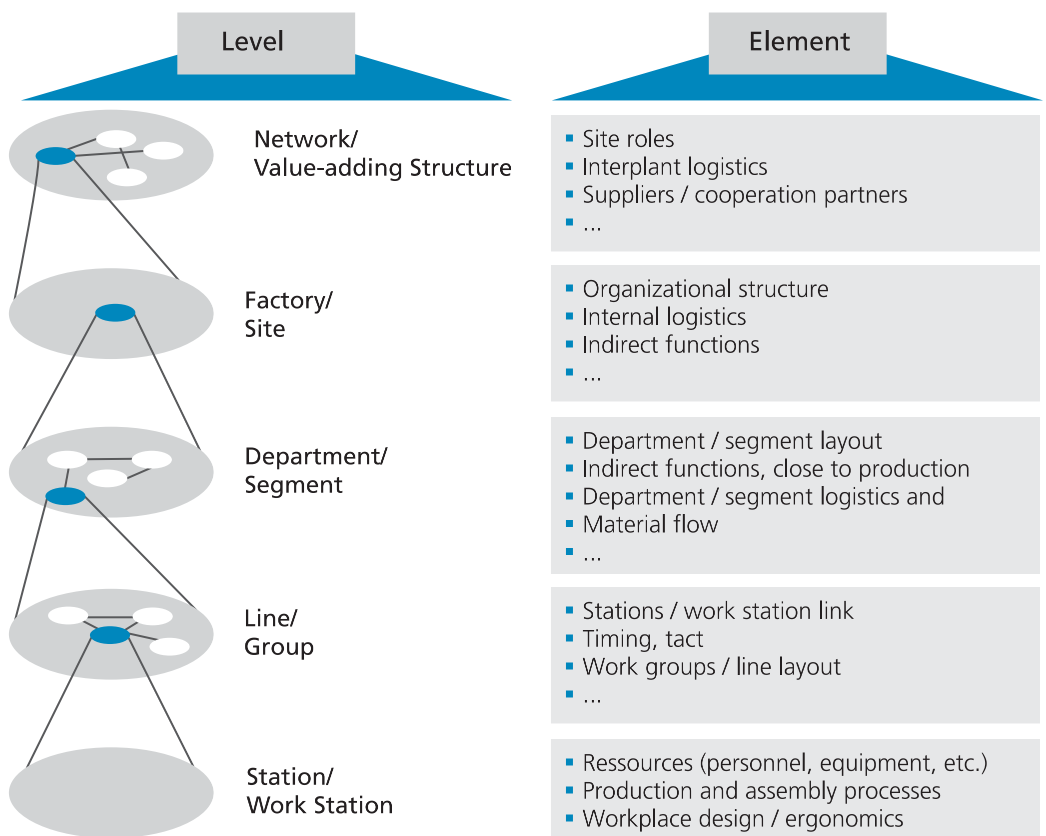


Figure 1: Different Levels Describe the Production

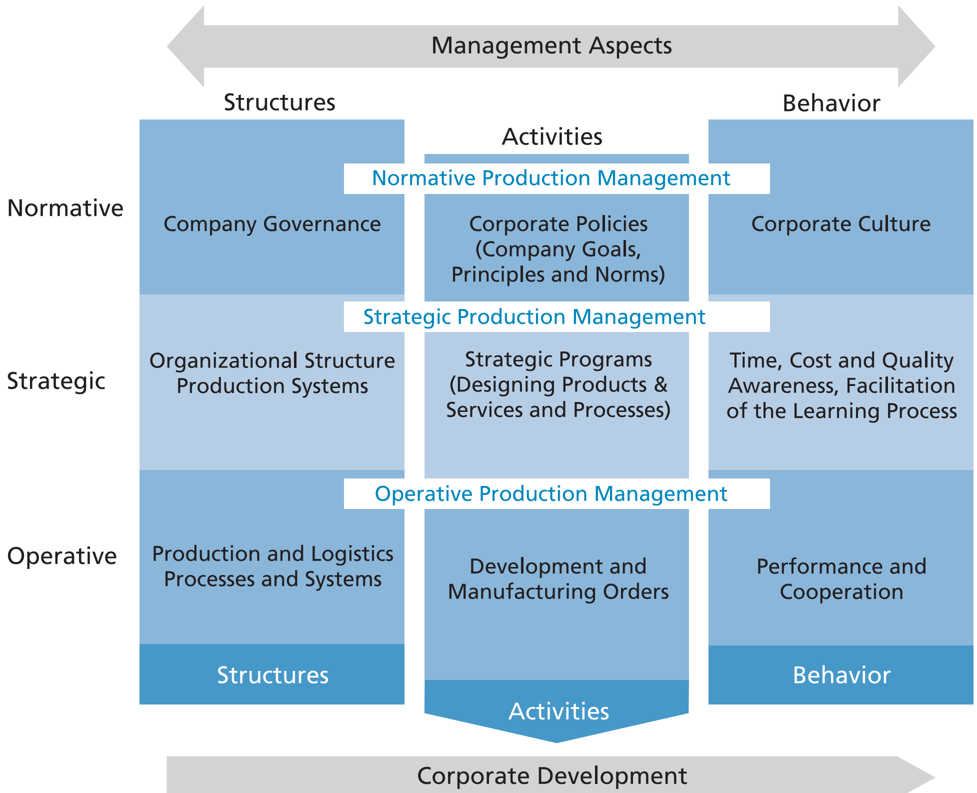


Figure 2: Production Management with the St. Gallen Management Concept

operative levels. The levels themselves are composed of activity, structural, and behavioral aspects, which allow for a comprehensive observation of the production environment.

Based on our project work experience, three problem areas can be deduced within production environments from a Complexity Management point of view:

1. Variety within the production system

- Product diversity: Heterogeneity of the products and their variants
- Process variability: Variances in the configuration of value-adding processes locally or between sites
- Resource diversity: Heterogeneity of resource demands with restrictions on resource allocation

2. Dynamics of the production system

- Variant flexibility: Reduction of product life-cycles and changing customer requirements
- Volume flexibility: Fluctuation in demand and decreasing order lot size

3. Instability of the production system

- Demand / Orders: Type and amount of orders
- System behavior: Susceptibility to interference of processes and resources

Variety-Induced Costs Increase

In industrial applications, the above described problem areas have an enormous influence on the production cost of manufacturing companies. Because of the product variance, augmented tool costs and an increased effort in logistics and planning occur. The process variance and the global allocation of value creation processes drive transportation, control, and re-work costs in particular. A variable resource demand leads to fluctuating capacity utilization, and this in turn leads to either high idle and/or down times, or to the utilization of additional cost intensive resources to adjust for peak loads. The increased need for flexibility manifests itself in increasing equipment and changeover costs. Uncertainty in the system primarily increases malfunctions, for example control problems, material supply problems, accidents, and emergency stops.

Even if the described interrelations are well known, we often observe in our consulting projects that, depending on the industry, the implemented product design is ineffective. The complexity is simply dismissed. Despite simultaneous engineering efforts, the design is poorly adapted for production. The continuity and the holistic examination of the market-product-production relationship from a Complexity Management point of view is often incomplete and consequently, the implementation ends prematurely. Production departments therefore try to face the (product) circumstances with technical, organizational, and ergonomic approaches from the large selection of lean methods (e.g. local performance increases, part specific batch size planning, isolated activity analysis). The knowledge of complexity-oriented approaches diverges by industry. Companies in the automotive industry currently rely on principals such as modularization of products through production segmentation, shifting the variant creation towards the end of the process, and the optimization of vertical integration through module allocation.

To Build a Bridge: Two Starting Points – One Approach

The approach that describes the context of existing insights as well as precise solutions for the complexity-suitable production design, encompasses four basic elements (Fig. 3).

A) Production Strategy. The main task of the production strategy is the establishment, utilization, and maintenance of strategic success positions. The task is implemented through product and business processes. The main focal point lies on shaping the production program and determining the depth, as well as the breadth of value creation within the production network ("Global Footprint"). With regards to the depth of value creation,

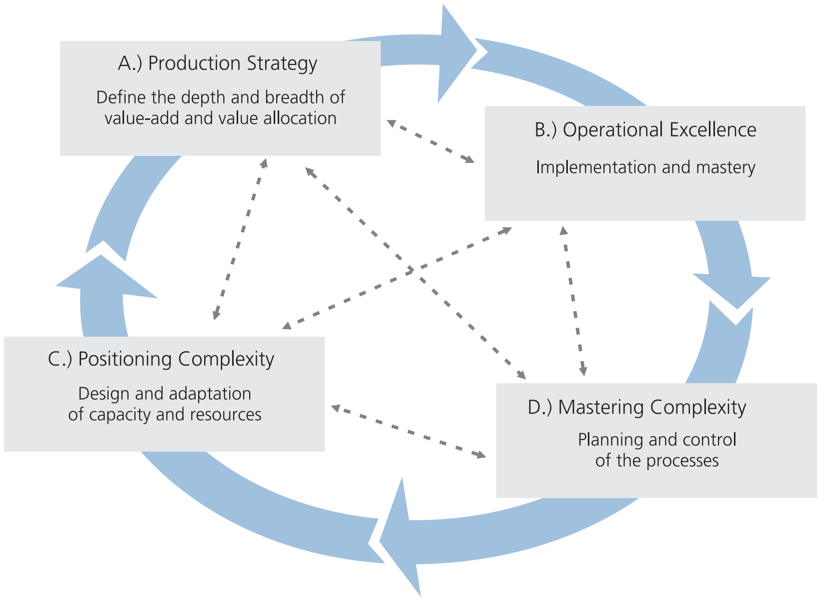


Figure 3: Measures for Complexity-Suitable Production Design

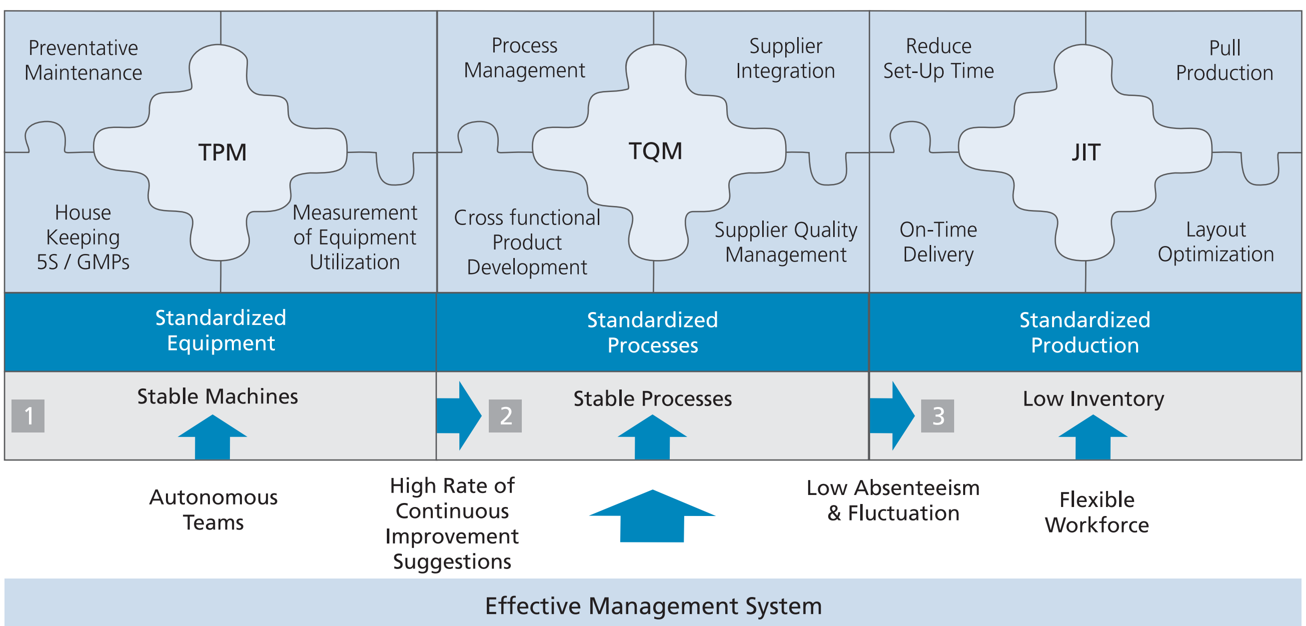
decisions about the conflicting demands of expansion and reduction have to be made, while for the depth the conflict between differentiation and standardization of pre-, semi-finished and end product has to be solved. After all, the allocation of value creation determines the role of single sites and plants.

The efficiency, with which the given production complexity can be regulated and mastered against the background of system dynamics and unpredictable instability, arises from the interaction between capacity and resource design as well as the planning and regulation of the processes.

B) Operational Excellence. The foundation of the production design with optimal complexity is built on the core elements of Lean Management, which Schuh & Company together with the Lean Enterprise Insitut communicates and applies. The pharmaceutical industry for example uses the reference model of "Operational Excellence" to optimize production (Fig. 4). The model was utilized within the scope of the largest study on the topic of Operational Excellence in the Pharmaceutical Industry. 110 companies participated and currently a succeeding study with approximately 160 participating companies is in progress. It analyzes and evaluates the implementation after the introduction of operational excellence initiatives.

C) Positioning Complexity. Designing capacity and positioning means to separate the existing process variety into volume, type, and process order. This takes place with the parallelization of processes into (partly) redundant resource groups, workload balancing, division of labor as well as the decoupling of processes.

To design and adjust the resources means to decrease the resource cost rate and the disproportionate increase



TPM = Total Productive Maintenance
TQM = Total Quality Management
JIT = Just In Time

Source:
Friedli et al.: „Operational Excellence in the pharmaceutical industry", ECV, 2006

Figure 4: Operational Excellence for the Pharmaceutical Industry

of the resource consumption compared to the process diversity. This can be achieved through the transition to flexible work force models, which allow for a need-driven approach of capacity. Alternatively, it is realized through the adjustment of the degree of automation, technology, and complexity of the utilized equipment (including tools and installations). Production structure matrices, for example, can aid the mapping of production variance onto the process variance.

D) Mastering Complexity. Mastering complexity of (varying) processes is coordinated via planning and control mechanisms within structurally specified degrees of freedom. Today's ERP systems and simulation application cannot depict the complexity and dynamics within the system despite enormous computing power. Planning against limited capacities is still foreign to many applications. Furthermore, adjustments of the planning parameters in the system on a short notice are nearly impossible. In this case, the production system has to be temporarily disabled and the approved orders can then be manually steered through the production.

Thus, future systems and controlling processes have to be extremely adaptable to be compliant with dynamic constraints. This encompasses capacity orientation including robust, simple, and quickly implemented controlling systems, which enable the adaptability of the value creation structure.

In principle, the three dimensions order classification, sequencing, and material and information provisioning are differentiated when discussing complexity management. The classification of orders and resources provides an optimization question within the boundaries of redundancy of a volume and variety intense production system. Within controlling, the degrees of freedom created through redundancy have to be used in order to make favorable order sequencing possible. This is usually the case when the variety of capacity requirements is minimized. From a complexity standpoint, especially the sequencing of manufacturing varying products is decisive, because the combination of variant groups and the variation of tact time has to be planned and regulated.

Implementation and Recommended Actions

We apply the described design and solution approaches within our consulting projects through the typical phases of analysis, evaluation, measure definition, and implementation. Process variants induced by the market and product lead us to focus on production capacity, production resources, as well as planning and control methods.

Based on our experience the following recommended actions for production design along optimal complexity arise:

1. Your production has to be strategically linked to the company's objectives and structure

2. Clearly define the core competence of your production, plants, and sites

3. Organize your entire value creation structure towards future demands of flexibility

4. Consider the continuity of market-product-production for your production design

5. Strengthen simultaneous engineering teams during product development

6. Consider the influence of complexity in terms of variety and dynamics on all levels of your production system and reduce your tolerance for process variance.

7. Focus your production on an easily implemented operational excellence initiative including all basic elements of Lean Management.

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Combining Optimal Global Variety and Efficient Production

Stephan Krumm / Frank Buerschgens and Jens Meier (both John Deere)

Even the most successful companies in their respective industries are experiencing a constant struggle to find their own optimum of complexity. Companies with international operations face the exceptional challenge to align the advantages of regional production and assembly with the overall corporate optimum. The example of John Deere shows how to intelligently avoid costs by utilizing complexity management early on.

John Deere is the most successful manufacturer of agricultural equipment globally. Its reliable and innovative products are offered across the globe and have helped create a strong and recognizable brand since the company's inception in 1837. The development of a modular product architecture in the early 1990's can be attributed to the success of meeting customer demands. This approach enabled the company to develop quality, speed, and cost advantages on an international scale. This strength bears at the same time the danger of being too lenient towards variant planning during the early phase of product development. The presumption exists that the modular kit minimizes the effects of possible misjudgments. John Deere Mannheim recognized that this assumption holds only marginally true and realized the large opportunities to minimize costs during the early phases of product development. The second largest production site served as a concrete example and created the necessary transparency in a short, yet intense, project. Additionally, the evaluation of several implementation scenarios helped to find and realize an optimum for John Deere. The goal of the project was to go beyond "simple" variant reduction and manage the variants efficiently along the value chain without limiting selections and variety of options for the customer.

"What is so special about a tractor?" This is almost an unavoidable question if one is not familiar with the product and current customer demands. Today, a modern tractor has little in common with the models of the post-world war period. Since then, the tractor has been converted into the mobile nerve center with multifunctional interfaces to a variety of applications. At the same time, it consists of major components, which impress in their size and rigidity.

Throughout the global production network of John Deere, an active exchange of components was established over the years. For example, large parts of the rear suspension for the models in the European markets are sourced as assembled units from Waterloo, Iowa. For companies, this logistical effort usually pays off if the quantities of each variant are large enough, and the demand can be accurately forecasted. If one of the two conditions is not met, a new optimum is required because of increasingly constricted capital and associated transportation costs. Alternatively, attempts are made to restore the necessary conditions through appropriate measures.

Essentiality – Sticking to the Basics

When a company develops a new product, it can for the most part freely decide which variants to offer. This freedom carries with it the risk that sales and technical

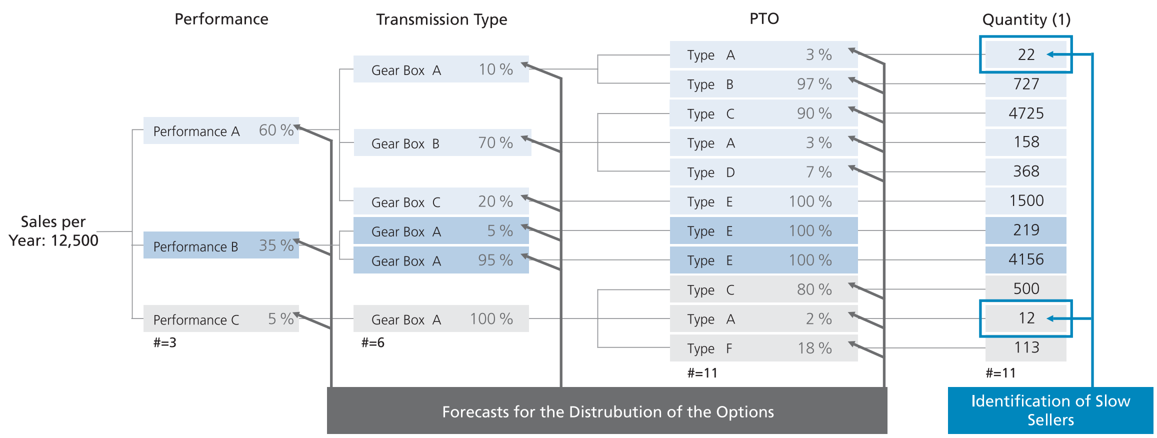

Figure 1: Consolidation of Sales Forecasts Leads to the Early Identification of Slow Selling Variants

departments, for example, include everything in the design which could be technically interesting, as well as slightly attractive to the customer. A first sign of over-complexity is if a replacement product, with the same quantity forecast and constant market share, features more product variants than its predecessor did.

A company that seriously wants to address the subject of optimal product complexity will not miss the chance to concentrate on the basics. It is imperative to critically question the existing designand to make the possible consequences of variant decision across the displayed variety transparent in order to evaluate it appropriately.

What sounds like an easy task, is in practice often associated with great efforts. Initially, all intended product characteristics and their projected specifications have to be documented. Certainly, most companies possess extensive documentation for this purpose, but this often allows for interpretation by the user. This locally arising variance is frequently quite large. In the worst case, the problem is only discovered when the development is already completed and its associated costs have already occurred.

The goal of the complexity management initiative at John Deere was to reach sustainable cost avoidance in conjunction with optimal customer value. On track to deliver optimal customer value, the projected product characteristics and their specifications were thus collected. Through discussions with the departments, practicable product variants were identified from the resulting theoretical variance. The options were limited by setting up technical and practical rules and prohibiting certain combinations of feature characteristics. Together with marketing and product planning, miscellaneous feature characteristics were derived based on past data. New features and specifications were derived from their purchasing probability and their impact on other configuration options. A picture emerged about which product variants would possess sufficient lot sizes to be relevant. In the past, similar considerations were made, however, the combinatorics were not accounted for and the applied excel-solutions supported the work insufficiently. By utilizing the Complexity Manager software, the work within the team became more efficient. Every change and its impacts were now transparent and directly traceable. As a result, several scenarios were developed and afterwards evaluated separately.

Where Can the Necessary Variance Be Generated Most Efficiently?

The product variance demanded by the market was reduced to the basics with the help of marketing and product planning. The next step called for an efficient implementation of the variance within the value added structure. Examples of fundamental questions that arose were: "Which components could be standardized and reused (Fig. 2)?", "In which plant should we assemble the components and to what degree?", "At which site does it make sense to produce?", and "Which scenario would be most economically realizable across all relevant departments?"

Similar to the collection of information about market requirements, different solutions were also discussed for engineering and production options. Examples of discussions centered on the one hand around the translation of different performance classes through the scaling of modules, and on the other, on alternative timing and locations for the component and final assembly (Fig. 3).

Logistics and tool costs, the high amount of capital tied in order management, and information generated by the different scenarios were especially relevant for the evaluation. The logistics costs were driven by variety and its associated increased transportation costs. At the same time, they were influenced by the emerging inventory costs in the final assembly. If the costs for plant and warehousing space are relatively fixed and additional components for slow selling variants cannot be stored anymore, the only alternative is to create costly new storage areas. Similar concepts apply to tool costs in the assembly. The question of whether or not tools have to be purchased twice because of the different times of variant creation, had to be resolved for each scenario.

Within the scope of the different technical options, which were quality, revenue, and costs, the right scenario had to be identified. As a result, the scenario with the lowest amount of variants was technically as well as economically not realizable. Nevertheless, the amount of the original variants was significantly reduced without a decline in revenue. By choosing the optimal timing

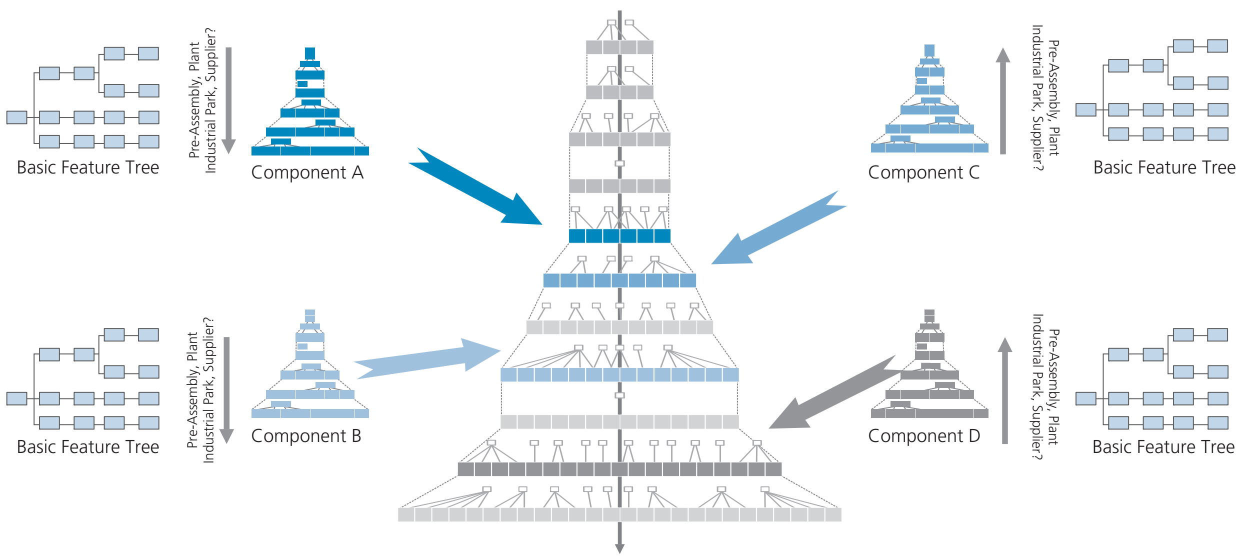

Figure 2: Transparency about the Variety of Component Modules and Product Level

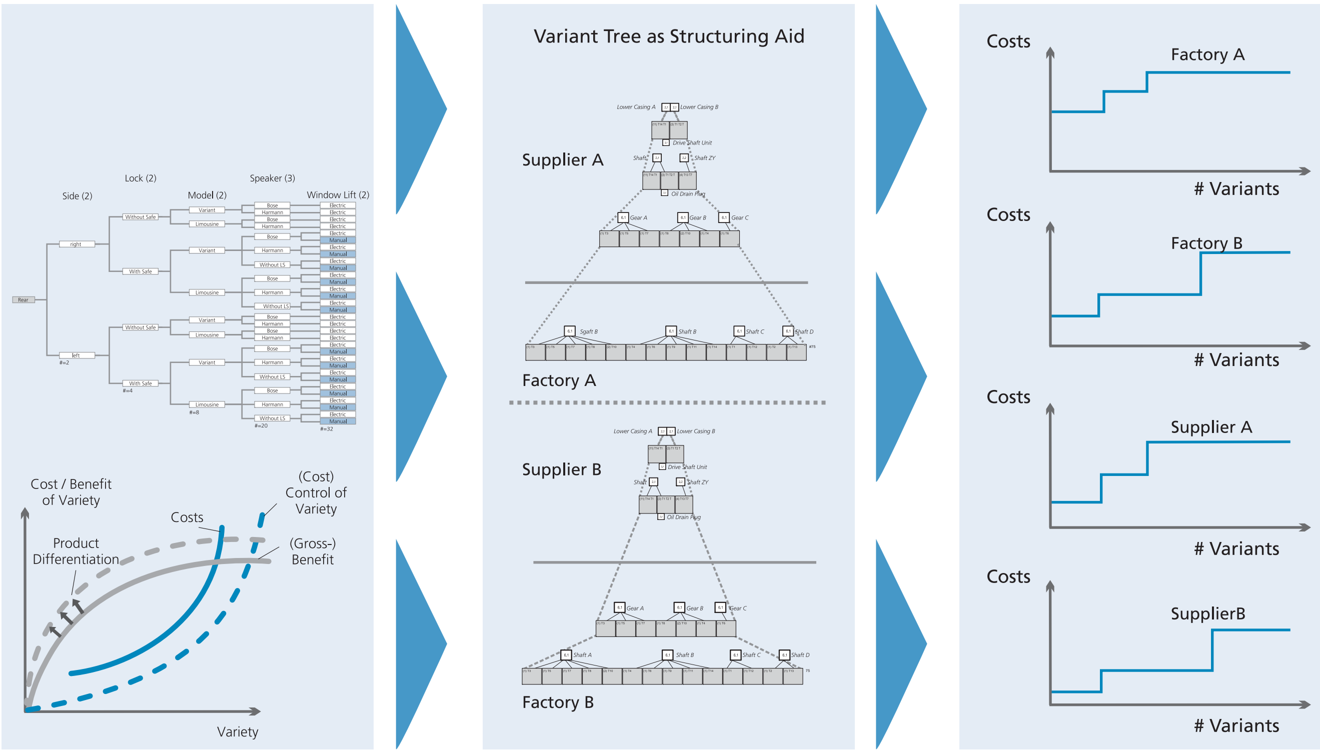

Figure 3: Nobody Pays for Your Waste

of variant creation, it was possible to avoid six-figured sums of costs per year. Because the result was achieved in collaboration with the company employees, the acceptance of and the commitment to the implementation were guaranteed. The fact that the implementation was accepted and continued from within the organization after the project ended, demonstrates that the approach of an integrated, active complexity management has a high degree of effectiveness.

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Avoiding Costs without Losing Revenue – Can the Squaring of the Circle Succeed?

Stephan Krumm (Schuh & Company) in discussion with Frank Buerschgens and Jens Meier (both John Deere) about the background of the project, experiences gained during the project, and hurdles on the path to results.

Mr. Buerschgens, you are responsible for the product architecture at John Deere, what prompted you to start this project?

The starting point for the project was our initial impression that the variance for the new series, which at the time was in the development stages, would significantly increase in comparison to the current product. The actual status of product development was unfortunately not fully transparent and we were concerned that we would encounter problems with the architecture design. At the same time, we wanted to contribute to the reduction of costs along the whole value chain. To achieve this cost reduction, we had to start during the development stage in order to achieve sustainability. We view complexity management as an intelligent version of cost management.

Mr. Meier, what are your main insights into the project as project leader?

Besides the cost reductions already mentioned by Mr. Bürschgens, there are two aspects that I would like to emphasize. On the one hand, it is the collaboration between the different departments and the consultants. The emerging, often very different, viewpoints on the subject as well as the experience of the consultants in this field made the work during the workshops and the discussion very open and productive. On the other hand, the creation of transparency about the status of the development process by the means of the feature tree and the underlying methods and tools, was very efficient. Thus, the same picture of variance materialized for everyone as well as the same understanding of optimization options. The project showed that it is certainly possible to give the client "his" variant and at the same time, control the resulting high overall internal variance at John Deere. Consequently, we were able to come this much closer to squaring the circle and to create a sustainable optimization of the product complexity for John Deere.

Mr. Buerschgens, awarding consulting contracts, particularly in the current economic situation, is closely scruitinized. Was the decision to hire consultants of value for John Deere?

By all means! The presence of consultants accelerates the process, because certain pressures exist. At the same time, the external consultant can address issues openly and question them without bias. If on top of this, as was the case for us, the results of the project can be expressed in internal performance indicators, such a project pays off even during today's situation.

The project is completed. What are the next steps, Mr. Buerschgens?

Individual topics that were identified within the scope of the project, are now addressed through the engineering department of the University of Aachen. Because of the good relationship between Schuh & Company and the university, this does not pose a problem. Especially since one of the employees of the engineering department was already involved in the project. At the same time, we expanded the scope of the project and expect corresponding results. The presence of Schuh & Company in the USA enables us to address complexity management with identical methods and tools at the headquarters in the USA, and allows for a quick global rollout if necessary. As you can see, complexity management is a permanent building block in the strategy of John Deere.

Doing the Right Things Right: Alignment of Improvement Efforts with Enterprise Strategy

Hans R. Tanner / Peter Freissle (Polydeck Screen Corporation)

Current Situation

Many successful start-up companies have difficulties to create the transition from the pioneer phase into the growth phase. The dominate role of the founder and his detailed knowledge of the market as well as of all internal operational procedures make it more difficult to share responsibility among several employees. The time constraints, as a result of the founder's success and the resulting work to be done, increasingly inhibit further growth. Innovative new product development, often a key element to success, is significantly reduced as a result. If this vicious circle cannot be broken, the enterprise stagnates, creates opportunities for competitors, and will eventually be at risk to be pushed out of the market.

Polydeck Screen Corporation is the leading manufacturer of screening media used for the screening of rock in coal, mining and aggregate industries. Instead of the traditional wire screen media, Polydeck offers an innovative solution using modular screen panels made from injection molded polyurethane or rubber. This solution provides a significant cost benefit compared to wire screens. So far, just about 15% of all aggregate plants in the US are converted to modular screens. Consequently, there is an almost indefinite market potential left to be explored. By the means of specific patents as well as by cost benefits resulting from industrial large-scale production using injection molding, Polydeck can effectively protect itself from smaller "Me-Too" suppliers who quite often use 2-component pouring to manufacture their panels.

After a period of stagnating sales, revenues started to grow exponentially right after the founder's son got involved in the business. By introduction of purposeful product innovations, it was possible to contract several new key customers within a short amount of time. In order to keep up with increased sales operationally, the number of employees grew continuously, however without restructuring the internal processes: as before, daily operations were directed very much hands-on by very few key people. Because of the many direct interventions in the manufacturing process, i. e. rescheduling based on urgent customer needs, a higher number of inefficiencies and errors started to develop, thereby causing reason for additional interventions. Consequently, valuable time used to deal with errors along the order processing procedure, was no longer available for maintaining customer relationships. When the amount of product returned from customers continued to increase, the enterprise found itself in the midst of a growth induced, but nevertheless success threatening crisis.

The Task

The problems were first perceived as production problems: Disproportionate growth of the number of production employees in comparison to output, quality problems in the injection molding processes as well as in the fabrication of welded support frames to go underneath the panels. Further problems were assumed at the interface between engineering and production; as it happened frequently steel frames needed to be manufactured that were not even completely designed at the time. In this situation, Polydeck asked Schuh Complexity Management to provide support to increase the efficiency in the production department, to improve the quality and achieve cost reductions.

The Approach

As in most cases when directed to a clearly defined problem area, it paid of to step back and evaluate whether the described problems also were the most urgent ones to attack. To do that, Polydeck agreed to get started with a one-day strategy workshop to develop a holistic view of the overall situation of the enterprise. Only after the workshop was held, the actual approach for the optimization of the internal processes would be defined.

During the strategy workshop, the different market segments of Polydeck Screen Corporation were systematically analyzed. This included an analysis of the market characteristics and the intensity of competition as well as the identification of the key competences an enterprise must purposefully develop in order to have above average success in its respective market segments.

The discussion during the strategy workshop quickly revealed that screen panels are incredibly customized products; in order to guarantee a stable gradation of the final product, the panels must correspond to technical specifications (e.g. aperture, angle of inclination, etc.), which are dependent on the raw material to be processed. Thereby, the moisture content of the raw material is of particular importance, so that „raw gravel from the right side of the road passing the processing site cannot be processed with the same screen, which is used for raw gravel originating from the left side of the road". Furthermore, a once determined specification must be examined and adapted with the progression of gravel extractions. A correct specification of the screen panels to be used therefore can only be given after thorough analysis of the local conditions. Thus, customer proximity is one of the dominant strategic success positions for that market segment.

In further proceedings during the strategy workshop a process portfolio was developed, showing all enterprise processes and evaluating them regarding effectiveness (achievement of objective) and efficiency (resource employment). The portfolio clearly showed that the processes right at the customer interface, in particular quoting and order acceptance and entry were poorly suited to successfully occupy the strategic success position "customer proximity". It was actually confirmed that in the majority of the cases not production errors were responsible for a false supply, but the systematic non-consideration of those persons, who were most familiar with the actual conditions at the customers; replacement panel orders were conveyed directly by the customer to the inside sales department and transmitted from there to production without further examination of specifications (Fig. 1).

The result of the strategy workshop was the jointly developed insight that a project with the sole purpose of increasing efficiency in production would only be helpful to do "the wrong things more economically". According to the requirements from a strategic point of view it was decided to first improve the processes Quote Generation and Order Entry, thereby achieving significantly improved customer proximity. In particular, it was the goal to better involve the people who know the customer best, the outside sales reps, in the process of order review. To

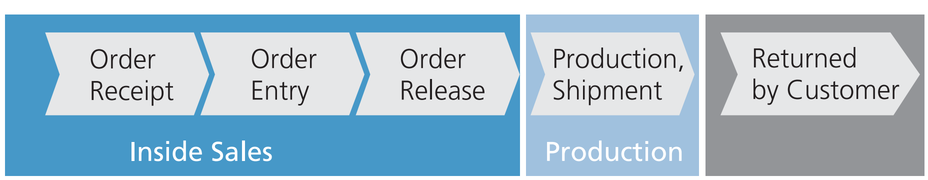

Figure 1: Order Processing, Before

have them approve the orders would almost guarantee that the customer would get what he needs the first time around.

Consequently, the interface processes to the customer were completely restructured. At the core of the new processes a web-based communication interface was developed that would provide a copy of all new customer orders to the respective sales representative and give him the opportunity to review and approve the orders from his customers. In addition, the tool would also provide a complete customer history in order to enable the sales representative to determine at any time whether a customer order corresponds to previously ordered items and, if necessary, correct the order (Fig. 2).

The Results

These measures were implemented within a rather short period of time. As a result, the Return Goods Authorization costs were reduced right away by approximately 95 %: Through systematic examination of all orders by the responsible outside sales people, wrong deliveries could practically be eliminated. The work load caused by "fire fighting" was voided and production capacity for other tasks was freed up. The amount of overnight shipment costs was clearly reduced. As visible indication of the improvement of the customer interface processes, the customer service department became obsolete: The remaining few inquiries and complaints could easily be answered by the inside sales representatives.

Of course, after these spectacular initial successes, the process optimizations were expanded to include additional processes – always in accordance with the appropriate strategic requirements. In the meantime the sales volume almost tripled while personnel growth was at approximately 25 %, a clear indication of the fact that the company succeeded to improve effectiveness and efficiency simultaneously.

As a result of the much better defined and also documented processes it became possible to distribute the responsibility for their daily execution to several individuals. For that purpose it was crucial to provide the processes with defined achievement goals and measured variables so that the outcome could be verified. This over time allowed the owner to gain confidence into the leadership abilities of his employees without being involved in all details. At the same time, the performance goals represent also an objective criterion, according to which the leaders on every level can align their work without running the risk that the goals will be redefined by the owner after only a short period of time. It became very clear that only by a systematic definition of the processes, based on market requirements and enterprise strategy; suitable conditions for the transition from the pioneer to the growth phase of the enterprise could be created.

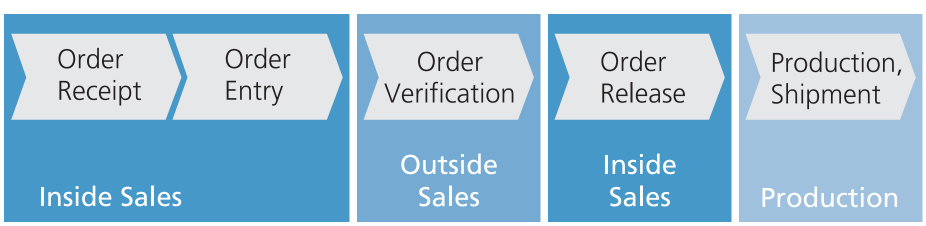

Figure 2: Order Processing, After

Conclusions

As it is often the case, the perceived problems were not necessarily the real problems. For this reason, every Change Management project should be started with the development of a shared understanding of the market situation. In small and medium sized enterprises, this can normally be achieved in a one-day strategy workshop. Besides the holistic understanding of the enterprises current situation, an evaluated portfolio of the most important business processes becomes available, which allows for prioritizing further work steps.

Another important principle is that process improvements are to begin at the front-end of the process chain: Errors in the early phases of the process execution will be amplified in later process steps and affect them even more. The best approach is to implement strategy-led improvements in the front section of the order processing chain and then to ensure that changes are being followed and become permanent.

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Company

Schuh & Company focuses on providing solutions and methods for managing the ever-increasing complexity of today's enterprises products and processes. With this approach the company established itself as implementation-oriented problem solver in the industry. Today the company consists of about 40 people committed to ensure your company's success through their work as strategy and organizational consultants, as well as management coaches.

Schuh & Company is headquartered in Aachen, Germany, with subsidiaries in St. Gallen, Switzerland (since 1991), and Atlanta, GA, USA (since 1998).

In 1999 Schuh & Company started the Complexity Academy initiative. The program provides valuable hands-on knowledge through its conferences and workshop events.

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