



Methodologies to Achieve Supplier Management Excellence

An Online Continuing Education Course for Engineers

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Methodologies to Achieve Supplier Management Excellence

Alin Ila

As today's organizations increasingly focus on cost control, onshoring, and nearshoring, and to keep pace with the incredible technological changes sparked by globalization and rapid digital advancement, deploying creative and effective supply line management methodologies has become a strategic imperative.

Whether an organization needs to simply select a readily available, off-the-shelf technology (such as a product, material, equipment, or service) or shift towards developing a new technology and supplier, a rigorous and methodical process needs to be employed.

There is a wealth of courses and training materials available out there on these topics. This course, however, is designed to share proven methodologies, practical approaches, insights, and real-world lessons learned from over three decades of global supply line management experience. These experiences have enabled the delivery of innovative materials, processes, and cutting-edge equipment technologies within a complex and fast-paced environment such as the semiconductor industry.

The overarching goal of this course is to equip new and experienced professionals working in supplier development and quality engineering roles with additional knowledge, best-known practices, and practical toolsets to build and manage the resilient, low-cost, and low-risk supply lines of tomorrow.

All methodologies and proposed approaches presented here are transferable across industries. They bring a unique blend of customer and supplier perspectives to supply line management responsibilities and cover the full lifecycle of a complex program - from specification development and market research to supplier or technology selection, development, qualification, deployment, and sustaining.

The course is structured into ten progressive modules designed to enhance the knowledge and capabilities in the areas of supplier development, quality management, and supply line resilience across the full supplier lifecycle.

Course outline:

Module 1: Introduction

- Supply chain environment profile amid increasing technology complexity and global disruptions
- Supplier management scope and reach overview
- Delivering Technology, Quality, Availability, and Cost (TQAC)

Module 2: Target Audience and Roles Definition

- Supplier Development and Quality Engineering, Roles and Responsibilities
- Expectations and competencies required for effective supplier engagement

Module 3: Specification Development

- Importance of early engagement in the technology specification development
- Managing the Total Cost of Ownership
- Why translating customer requirements into clear, measurable, and risk-free specifications is crucial

Module 4: Supplier Selection

- Methods of developing comprehensive supply line databases
- Planning supplier evaluations
- Closing the supplier selection

Module 5: Supplier Onboarding

- Planning for the assessment of supplier technical and manufacturing capabilities, quality management systems
- Identification of operational, technical, and quality risks
- Development of improvement opportunities across suppliers and sub-suppliers

Module 6: Key Operating Systems Assessment

- Non-conformance and Excursion Management
- Change Management
- Process Control
- Metrology
- Disaster Recovery

Module 7: Supplier Relationship Management

- Building effective relationships through transparency, trust, and collaboration
- Long-term benefits of collaborative and open environments
- Recognizing and celebrating supplier successes

Module 8: Supplier Performance Improvement

- Sustaining supplier performance post onboarding and qualification
- Managing change, scalability, and long-term supplier health

Module 9: Intellectual Property and Innovation Management

- Protecting organizational IP while fostering collaborative innovation
- Methods for identifying, capturing, and documenting intellectual property throughout the entire lifecycle

Module 10: Summary and Conclusions

Module 1: Introduction

Process technologies are becoming increasingly complex, particularly cutting-edge technologies in industries such as semiconductors. These complexities bring additional challenges in areas such as technical, quality, cost, and supply chain. As a result, the supply lines operate under constant pressure to perform faster, cheaper, better, and be more reliable than ever.

Additionally, the emerging trends like onshoring and nearshoring add uncertainties, costs, and availability pressures, at least in the short term.

The robustness of a supplier's business processes, the strength of its quality culture, and the health of its sub-supply chain are all becoming key attributes in ensuring an uninterrupted supply line for customers. This has become even more evident in recent times, for example, the global pandemic and subsequent worldwide shortages of commodities like semiconductors.

Traditionally, supply chain organizations focus on managing Tier-1 suppliers, such as the OEMs, as it seems to be a cost-effective approach to supply line management. In turn, they are expecting the OEMs to manage their own supply lines (Tier-2) for materials, spares, services, etc. In other words, the OEMs are held responsible for maintaining a healthy supply line throughout.

However, given the complexities and sensitivities mentioned above, the supply chain organizations of today must adopt a new approach when managing some of the critical materials or components, viewing these Tier-2 risks and opportunities through a different lens.

Historical supply line challenges - such as quality issues, capacity constraints, company acquisitions, or raw material shortages - can trigger lengthy and resource-intensive task forces and jeopardize the supply line continuity. This could potentially impact manufacturing schedules, drive costs upwards, and threaten business relationships. Some key areas of risk include single-sourced suppliers, intricate or

lengthy manufacturing processes, and financially unstable suppliers. Identifying these areas, and the suppliers involved, and creating and deploying risk mitigating measures as early as possible is crucial, and it will enable customers to navigate the inevitable supply line challenges more efficiently and cost-effectively.

This course focuses on the selection and development of new suppliers, whether to replace an existing one or add one to the supply line portfolio.

Participants will gain an overview of the supplier development and quality management process and learn approaches that **Supplier Development and Quality Engineers (SDQE)** have applied in the past with exceptional results.

Onboarding a new supplier could be a complex, multi-year process requiring a large team of engineering, quality, supply chain, and commercial expertise. The more advanced the technology, the longer and more challenging the process becomes. Quite an endeavor for any company, and an expensive one at that. Consider also that this all needs to happen in a fast-paced environment where time to market is essential.

And it is because of these aspects that the supplier selection and the onboarding processes must follow a robust, ROI-driven methodology to ensure organizations achieve measurable benefits - whether in total cost, lead time, technological advantage, or overall supply chain performance – and ultimately end up with the Right solution.

The ultimate goal of this endeavor is to enable customers to discover, select, develop, and optimally manage an uninterrupted supply line capable of delivering the **Technology, Quality, Availability, and Cost (TQAC)**.

Module 2: Target Audience and Roles Definition

In general, large companies with complex manufacturing processes need an extensive supply base. The more complex the process, the more extensive the supply base, and it is, in some cases, in the thousands. Semiconductor manufacturing is a prime example of this level of magnitude and complexity.

In turn, these supply line ecosystems are complex, and to manage them, companies tend to establish specialized organizations, structured as Supply Chain or Supplier Management. Their responsibilities, however, extend far beyond the known logistics aspect of a supply chain organization. In essence, these organizations are actively managing the suppliers to ensure a consistent delivery of the TQAC objectives.

Most importantly, these organizations become a crucial link between the internal organizations, such as technology development, business units, or manufacturing, and the external organizations, the suppliers, ensuring constant and clear communication, alignment, and crisp execution of the deliverables, on time and within budget.

The SDQEs find themselves at the center of this ecosystem, and to accomplish all of the objectives above, they will need to develop and master a broad set of competencies, including:

- Technology – deep understanding of the technology being developed or managed; ability to translate complex technical requirements into clear, measurable, and attainable specifications; determination to ensure suppliers understand and commit to the specifications, as ambiguities or uncertainties are detrimental at this stage since they can result in delays, costs overruns, or relationship deterioration.
- Quality – understanding and mastering of the business processes and quality systems assessments, or audits, and most importantly, the prevention methodologies; this may include employing non-punitive approaches to encourage and incentivize stakeholders; developing and deploying a quality culture and mindset across all aspects of suppliers’ operations.
- Capacity oversight – constant monitoring of critical items to ensure the supply line is healthy and can deliver on time and at the required quantities; effective and proactive collaboration with all internal and external organizations on risk mitigation and improvement plans to avoid disruptions, enhance capacity, source and select additional suppliers, and monitor inventory levels.
- Business acumen – understanding and managing all cost aspects of the program, starting at the selection stage, through development and into sustaining, ensuring costs are continuously monitored and driven towards reduction, anticipating and minimizing cost increases, capitalizing on improvements from technology enhancement, enabling and implementing manufacturing yields improvements, supply line optimizations, etc.

As a matter of day-to-day responsibilities and deliverables, the SDQEs create and interpret complex data such as technical specifications, regulation compliance, and manufacturing data, and develop adequate action plans, while collaborating and leading global cross-functional teams in challenging and sometimes ambiguous environments.

Using all the engineering tools and methodologies available, or sometimes creating new ones if none are available, the SDQEs evaluate supplier performance and develop improvements as needed, continuously searching for opportunities and coaching the suppliers along the way to adhere to this philosophy.

Program management is another hat that SDQEs wear, as any program will require roadmap definition, planning, and monitoring of deliverables according to the budget and schedule. For this as well, there are multiple tools and methodologies out there that can be employed.

One other main responsibility of the SDQEs is navigating challenges and issues, quality excursions, crises, safety incidents, supply line shortages, and cost increases. Containing the problem and minimizing any damages or losses, as soon as possible, is key. Still, it needs to be followed by a timely identification of the root causes and the implementation of proper corrective actions.

But perhaps, even before all this, anticipating the risks, the potential bottlenecks or issues, is ever more important. In today's day and age, schedules are getting more compressed than ever, time to market is becoming ever shorter, so once an issue has occurred, it is already too late, and it has some level of impact. That is why, surfacing risks and implementing mitigating plans is not a nice-to-have anymore; it is mandatory.

This is somewhat of an acquired skill or capability, so becoming an expert in this area would be beneficial to be present on any SDQE's career improvement plan. Examples of some of these potential risks that need to be mitigated are single-source parts or suppliers, suppliers in troubled geographies or going out of business, material obsolescence due to international regulations, or raw material scarcity (exotic materials, mined materials, unique manufacturing processes, and application parts, etc.).

Finally, success in this area requires a high degree of flexibility to uncertain and ambiguous environments. When the risks and uncertainties are established and areas emerge, with plenty of uncertainties, the SDQEs need to adapt, learn, and change course, losing any steps along the way. Companies can't afford to be rigid.

All throughout, internal and external communication is key. Importantly, the executives, as well as external customers, need to be kept in the loop. Clear, crisp, and timely communication has become a must. When to communicate, when to do it, assessing and communicating the risks, and the support needed, or even highlighting the accountabilities, are all critical. The SDQEs need to ensure stakeholders are informed and will keep the project on track.

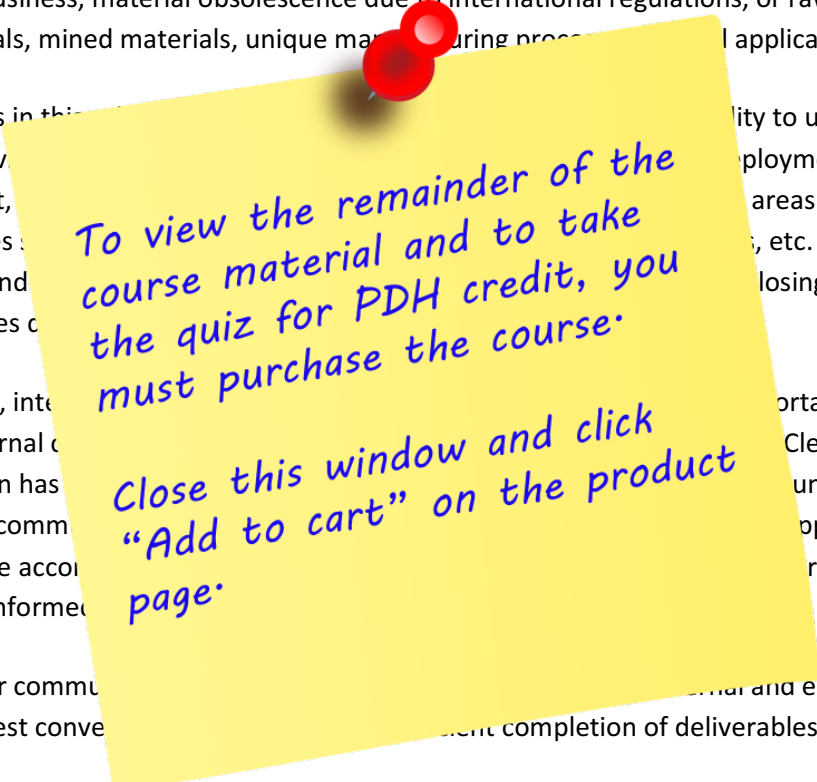
Good and clear communication is essential for internal and external, allowing for frank and honest conversations and the timely completion of deliverables.

In general, the few guiding principles at the foundation of achieving this are: Communication, Trust, Transparency, Accountability, and Collaboration.

Module 3: Specification Development

Once a particular technology need or a technology gap is identified, a technical specification needs to be developed. This can be simple, such as the technical specification for an off-the-shelf commodity, or it can be very complex, such as the technical specification for a new piece of equipment.

In either situation, this is not only the perfect opportunity, but rather a must, for the SDQEs to engage in the definition, creation, and refining process of this specification. Having the current or the future supply line in mind is key when defining specifications for technologies that need to be developed and delivered on time, on cost, at quality, and at capacity by any supplier.



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