A Joint Publication

Key Performance Indicators for Automotive Supply Chain Management

Version No: 2.0

Ref No: LK03

Date: May 2020

Published by:
Odette International Ltd
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FOREWORD

This recommendation provides a common definition of standardized indicators to measure supply chain performance within the automotive industry for both production and service parts.

In 2006, Odette and AIAG jointly published "Key Performance Indicators for Global Materials Management and Logistics" in order to avoid each automotive company creating its own materials management and logistics KPIs. The objective of the recommendation was to define and promote common indicators and common understanding between trading parties in the automotive supply chain in order to increase performance and reduce cost. To ensure the on-going quality of the existing publication, Odette and AIAG have jointly updated "Key Performance Indicators for Global Materials Management and Logistics" and have renamed the new version "Key Performance Indicators for Automotive Supply Chain Management (KPIs for Automotive SCM)".

In summary, KPIs for Automotive SCM provide visibility of supplier performance and facilitate objective quantitative and qualitative evaluation. With this recommendation, organizations are encouraged to define their KPIs and expectations in their supply chain management agreements.

ACKNOWLEDGEMENTS

All members of the AIAG/Odette Key Performance Indicators for Automotive Supply Chain Management (KPIs for Automotive SCM) Project Group have contributed to the content of this recommendation. Project Group members and the companies they represent include the following:

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1 GENERAL FEATURES

1.1 Objective of the Recommendation

This recommendation defines standard key performance indicators for materials management and logistics in the automotive industry. Common indicators will facilitate understanding between business partners, align with the requirements of Global MMOG/LE and support risk management.

Using this recommendation, a company can fulfill internal objectives while using indicators common to the industry that are better understood by suppliers and customers.

The standard indicators specified in this recommendation should form the basis for performance measurement systems. Customers may specify additional criteria to be used for their own supplier evaluations.

1.2 Goal and Benefits

Common standard indicators will improve performance and thereby reduce cost in the supply chain. The indicators will:

- benefit the supplier by harmonizing materials management and logistics performance indicators within the industry,
- benefit the customer by facilitating the implementation of supplier delivery performance systems based on harmonized indicators,
- identify potential risk and areas for improvement,
- provide an essential input to the selection and evaluation process of an organization's suppliers.

1.3 Scope

The following defines the scope of this recommendation. Indicators refer to process itself and the metrics are used to express the indicators.

In Scope:

- SCM processes between customer and supplier in the automotive industry.

Note: "Between customer and supplier" can signify:

- OEMs and suppliers
- suppliers and sub suppliers (e.g., between Tier N and Tier N+1)
- two plants of the same company (e.g., internal supply)

Out of Scope:

- internal logistics indicators (e.g., stock level, cost indicators, etc.)
- indicators for logistics processes in preproduction phase (processes common with engineering and quality)
- indicators for transport /carriers /logistics service providers
- product quality metrics (e.g., PPM)

1.4 KPIs for Automotive SCM in Relation to Global MMOG/LE

KPIs for Automotive SCM should provide the basis for measuring the performance in accordance with the SCM agreement and/or purchasing contract. These measurements are complementary to the Global MMOG/LE evaluation tool, which facilitates a supplier's self-assessment of its supply chain management capability. KPIs for Automotive SCM measure the effectiveness of the materials management and logistics processes between parties.

Global MMOG/LE Chapter 1.2 Objectives requires supplier performance metrics (e.g. on-time delivery, receipt discrepancies, ASN accuracy) to be defined and measured. It then specifies how these metrics should be used with suppliers from the initiation of new business through regular production and also for risk management.

In the initial discussions with potential suppliers, existing performance metrics should be reviewed as a part of the selection process (MMOG/LE Chapter 6.1 Supplier Selection). Once a supplier is awarded the business and is in production, there should be a process defined to provide the regular performance metrics (MMOG/LE Chapter 6.7 Supplier Assessment). The performance metrics, along with any known risks, and supplier assessments should be used to determine the overall performance of the supplier. The overall performance results should be communicated to all relevant parties (e.g. suppliers, management, purchasing) and be taken into account in risk assessment to allow corrective actions to be taken, as required.

The figure below graphically depicts which metrics are considered in the Global MMOG/LE requirements for supplier performance.

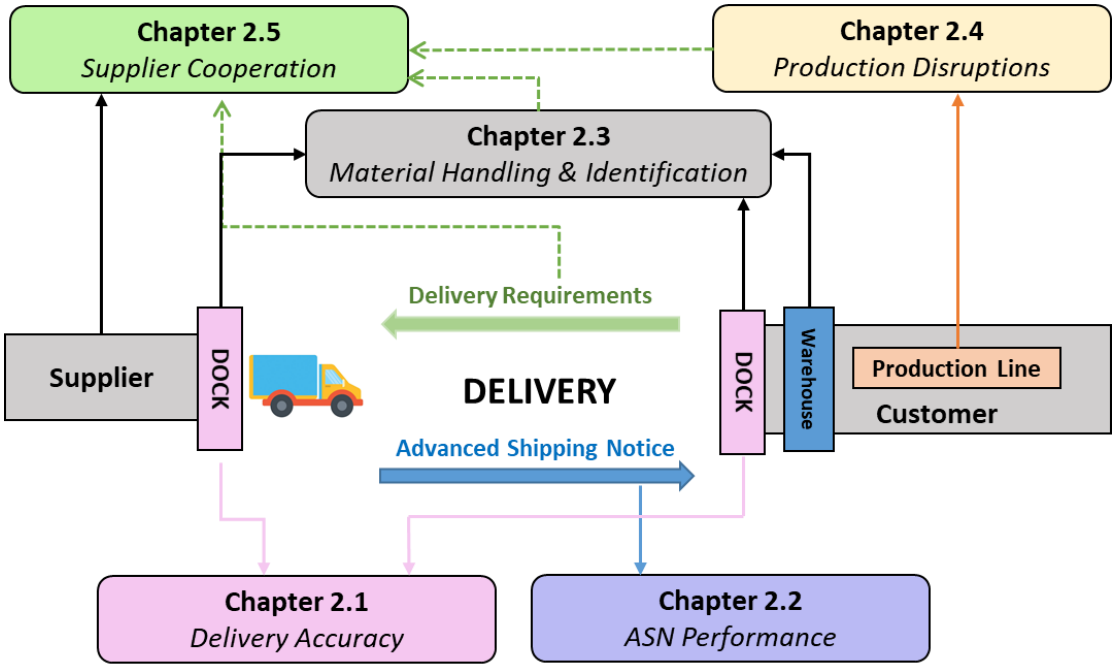

Figure 1. The Relationship between the KPIs for Automotive SCM and the Materials Management and Logistics Processes--Supplier and Customer

2 INDICATORS

Overall delivery performance concept

The concept (Figure 2) for the evaluation of supply chain delivery performance is divided into two components:

- Delivery accuracy
- Deviation catalog

Product/part quality aspects are not considered in this recommendation. These are recorded and processed via quality management processes.

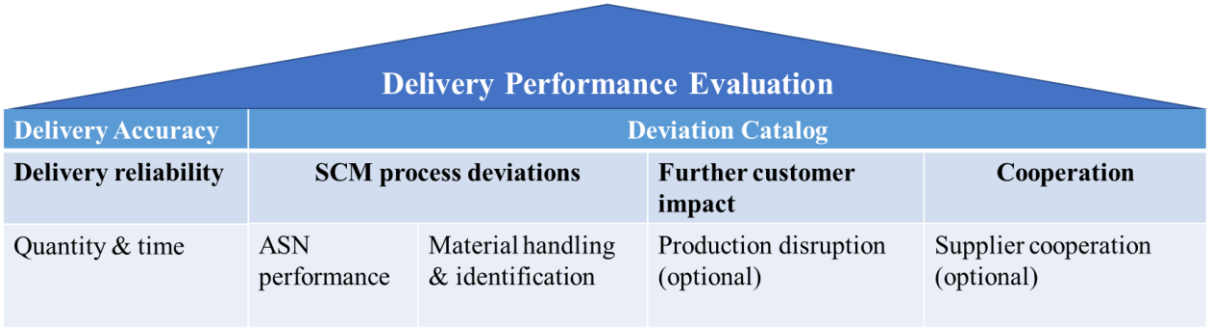

Figure 2. Delivery Performance Evaluation

Delivery accuracy measurement provides a consistent methodology for measuring the factors of quantity and time, i.e. the measurement whether a material was delivered in the requested amount on the requested delivery date/time.

Indicator	Main Criteria	Sub Criteria
Delivery Accuracy	Quantity	Actual delivery quantity versus requirement
	Time	Actual delivery time versus requirement

Figure 3. Delivery Accuracy

The deviation catalog (see Figure 4) is a recommendation for the recording of SCM process issues within standardized categories. The "**SCM process deviation**" categories include the accuracy of

advance shipping notices (ASN), material handling and labeling. "**Further customer impacts**" are described as production disruptions caused by SCM process deviations. The third category, "**cooperation**", contains the communication behavior between supplier and customer. It should be noted that, in contrast to the other two categories, this category represents a subjective assessment and is carried out individually by each company.

Indicator	Main Criteria	Sub Criteria
ASN Performance	Presence / Timeliness	ASN does not exist and / or not transmitted at required time
	Accuracy	ASN data is not correct
Material Handling and Identification	Packaging	Non-compliance with packaging design
		Non-compliance with quantity
		Unclean / damaged packaging / safety
	Labelling	Label not readable
		Mislabelling
		Non-conforming label; missing or incorrect data or logo
	Delivery documents	Inaccuracy of data (purchase part number) or delivery note
		Quantity delivered not equal to quantity on delivery note
		Parts delivered without a Delivery Note
		Non-compliance with specified delivery note template
		Specific delivery documents missing (customs, control report)
Production Disruption	Production Schedule Modifications	Number of production schedule modifications
		Units on hold on the physical flow
	Incomplete Units at point of fix	Incomplete units at end of line
		Incomplete units held back before end of line
	Line stop	Lost production
Suppliers Cooperation	Self Sufficiency	Does supplier understand customer needs, manage business?
	Reliability	Is concern a repeat concern?
	Responsiveness	Is response to customer request or response to concern late / overdue?
	Availability	Is supplier contact / contact person readily available?
		Is contact information / address data available
	Problem Notification	Does the supplier understand customer need?
	Flexibility	Is the supplier flexible to customer needs and ordering demands?

Figure 4. Deviation Catalog

2.1 Delivery Accuracy

2.1.1 Objective

The purpose of the Delivery Accuracy indicator is to measure the shipment's conformity according to the SCM requirements/agreements.

2.1.2 Scope and field of application

The Delivery Accuracy indicator can be applied when the delivery schedule/purchase order is expressed in terms of a firm quantity and firm delivery date/time.

Other delivery concepts (e.g., Kanban, VMI, synchronous delivery, bulk shipment) may require an adaption of delivery accuracy calculation. It is up to the customer to use these cases as a separate indicator or as a consolidated indicator for delivery accuracy.

2.1.3 Definition of the indicator

The Delivery Accuracy indicator measures the SCM process deviation in the delivery of parts using the factors of quantity and time, i.e. the ordered quantity of materials was provided at the required date/time.

The measuring point for delivery reliability is based on the Incoterms or delivery conditions commercially defined (e.g., by Purchase Order).

Below are some examples of commonly used Incoterms in the automotive industry.

FCA/EXW: The measurement is based on dispatch at the supplier. As basis for the data in general the ASN is available. At the physical goods receipt, the information from the ASN (especially the quantity) can be verified and if needed the evaluation can be corrected.

DDP/DAP: The measurement is based on arrival at the customer. In general, the physical goods receipt is available as base data. If an earlier system-side recording of the arrival of the delivery takes place before the physical goods receipt, this can also be used.

Delivery accuracy is defined as a measure of the fulfillment of the order based on the following criteria for each part number supplied:

- Quantity is the amount of parts (possibly also weight, volume etc.) per part number.
- Target quantity corresponds to the number/quantity per part number ordered by the customer at the last valid call (order quantity or release quantity).
- ASN quantity is the number/quantity per part number delivered according to ASN.

Actual quantity is the actual delivered quantity/quantity per part number that the customer measured in the goods receipt.

Time describes the period when the measurement took place (date/time).

Target time is the calculated date/time on/at which the delivery must be dispatched or must arrive at the customer (depending on the agreed Incoterm).

ASN time is the date/time when ASN is completed. This should be when the delivery is fully loaded and ready to depart.

Actual time (delivery time) is the date/time on/at which the delivery is dispatched or arrives at the recipient / customer

Order Time Window/Delivery Time Window is the time frame for which the delivery is planned (for example, daily, hourly, etc.).

2.1.4 Rating rules

The basis for the delivery accuracy measurement is the time period to which a delivery schedule refers. In the simplest case, the delivery schedule for a part number contains a schedule line per day, so that the delivery accuracy is measured per day. On the other hand, if quantities are scheduled in the delivery schedule for a different delivery cycle, e.g. per week, shift or hour, then the delivery accuracy for this period is relevant.

Appendix A is a proposed way to measure delivery accuracy.

2.1.5 Calculation of Delivery Accuracy

The following are the prerequisites for an accurate delivery score for a part number:

- The actual quantity of the measured time segment matches the target quantity of the time segment.
- The actual time of the measured time segment matches the target date/time of the delivery.
- There is no backlog from previous periods at the beginning of the measurement.

For a specific part number, a time period in which all the above conditions are fulfilled is considered as accurate. A time period in which any of the above conditions is not fulfilled is considered as not accurate.

This means that a time period in which a backlog of a part number is caught up is not measured as accurate.

For periods in which no quantities are allocated for a certain part number and no deliveries take place, no delivery accuracy is measured for this part number. This also applies if there is a backlog or there is an over delivery during the period.

A prerequisite for a correct evaluation is a valid delivery schedule according to the contractual basis. In exceptional cases orders can be transmitted which exceed the contractual agreement. These cases must be taken into consideration in the evaluation. If this is not done, the supplier has the possibility to raise a dispute and to correct (in collaboration with the customer) the delivery accuracy KPI.

The process on how to do this should be agreed individually between the two contract parties.

2.1.6 Exceptions/data correction:

In the event that the delivery accuracy of a supplier has been incorrectly assessed, it must be ensured that the relevant measurement can be adapted or be excluded from the process and/or the system. The communication and the exchange of information must be exercised by the customer as described in Chapter 3.

Example 1: Exceeding the contractually agreed capacities for all customer locations when determining delivery reliability.

Example 2: The actual quantity differs from the evaluated ASN quantity. In this case, the evaluation for the affected event in the base data should be corrected.

2.1.7 Vendor-Managed Inventory (VMI)

In case of VMI, there is an agreement between customer and supplier concerning the provisioning of one or several part numbers. The inventory management is carried out by the supplier, not by the customer. The stock has to be maintained between the defined minimum and maximum stock levels. Under this condition, the delivery quantity and time have no influence on the measurement of delivery accuracy. In this case, there is no defined quantity and no defined delivery time. To apply a delivery accuracy measurement, the calculation has to be adapted as follows:

Arrival time: The customer controls at defined periods and time-slots (e.g. at the end of a day) the stock level instead of the delivery time.

Actual quantity: Instead of the actual delivery quantity, the stock level is to be measured. If during the measurement the stock level is within the defined min/max parameter, the measurement is accurate. The min/max level can be static or dynamic.

2.2 Advanced Shipping Notice (ASN) Performance

2.2.1 Objective

A fast, reliable, integrated, accurate and standard information flow is necessary to reduce lead times in terms of physical and document flow. The ASN provides information to the customer so that they are aware of what the Supplier has shipped and can plan accordingly.

The objective of the ASN Performance indicator is to measure the presence, timeliness and accuracy of ASNs.

2.2.2 Scope and field of application

The organization shall have the capability to send ASNs in line with customer requirements and relevant industry standards. ASNs shall conform to the agreed EDI communication standard. The shipment process shall also ensure that each ASN is transmitted at the time of dispatch in accordance with customer requirements as defined in SCM agreements (e.g. terms and conditions, supplier manual).

The organization shall ensure that the data content of all ASNs is complete and accurate in accordance with customer requirements.

2.2.3 Definition of the indicator

ASN Performance KPI is a measurement of the presence, timeliness and accuracy of an ASN.

2.3 Material Handling and Identification

2.3.1 Objective

Material handling and identification supports the shipping process as follows:

- Accurate and timely documentation helps to avoid delays and extraordinary costs in the transportation of material, including any potential supply chain security and/or customs issues.
- Effective packaging facilitates efficient storage, transportation, and accessibility of parts while providing protection and preventing deterioration.
- Labeling allows for visual identification of material and supports automated data entry, thus increasing the accuracy of data in the production planning and inventory management systems.

2.3.2 Scope and field of application

The shipment process shall ensure that the material handling and identification process is in accordance with customer requirements as defined in SCM agreements (e.g. terms and conditions, supplier manuals).

The Material Handling and Identification indicator measures the supplier's ability to provide and comply with the appropriate labeling, packaging and shipping documentation as defined by customer, industry and government requirements.

2.3.3 Definition of the indicator

The Material Handling and Identification indicator is measured by evaluating the conformity of the following specifications:

- packaging specification
- labeling specification
- delivery document specification
- loading specification (if applicable)

Further explanation is given in Appendix B.

2.4 Production Disruptions

2.4.1 Objective

The objective of the Production Disruption indicator is to qualify and quantify supplier incidents that have a significant impact on production. An alert is raised and associated penalty is applied when it is determined that a part required for a production process is not available.

2.4.2 Scope and field of application

The indicators that measure the production disruptions apply for both line and batch production. Service parts are out of scope of this indicator.

Indicators:

- units on hold in production flow or production schedule modifications
- incomplete units
- line stop

2.4.3 Definition of the indicators

A. Production schedule modifications

Production schedule is modified in order for the customer to continue its operations without stopping production.

B. Incomplete units (for a part number)

The production of finished product is incomplete due to material not being available. Production is completed when material becomes available.

C. Production stop

Production is not possible due to material not being available.

2.5 Supplier Cooperation

2.5.1 Objective

This section defines a set of indicators to measure supplier performance on the following processes:

- Collaboration and communication
- Applicability to customer requirements as defined in SCM agreements
- Handling SCM incidents

2.5.2 Scope and field of application

This indicator applies

- between the Supplier plant and the Customer plant
- for all types of supply
- for all types of parts delivered

This indicator is independent of the volume delivered or the number of deliveries and is focused on the customer service that the supplier provides.

2.5.3 Definition of the indicator

Performance criteria are defined for each of the three processes listed in the Objective section 2.5.1.

The six criteria defined below are used to measure the performance of the three key processes identified in the Objective section 2.5.1:

Self-sufficiency evaluates the capacity of a supplier to understand and apply the logistics processes as defined in the supply chain agreement.

Reliability measures the quality and effectiveness of the action plan.

Responsiveness measures conformity to the required response time.

Supplier Problem Notification evaluates whether the supplier is notifying the customer of problems in advance, allowing more reaction time.

Availability evaluates how easy it is to contact the Supplier's contact person.

Flexibility evaluates the adaptability of the Supplier when changes are necessary.

The measurement of a supplier's cooperation is defined in the supply chain agreement.

3 APPLICATION CONDITIONS

A SCM agreement should be in place before this recommendation is deployed. KPIs used by the organization must be defined within the SCM agreement.

3.1 Communication between Supplier and Customer

Results of Indicator Measurements

The Customer must communicate all incidents and performance results to the supplier.

In the case of an incident, communication may be initiated between the customer and supplier to provide a corrective action. The following steps are recommended:

- Customer sends an incident report with description and consequences to the supplier as soon as the incident occurs.
- Supplier establishes an immediate action plan to resolve the consequences of the incident according to the customer requirement.
- Supplier reports the progress against the action plan as required by the customer until the incident is closed.
- Supplier (and possibly the customer) identify the root cause and define an action plan to permanently resolve the problem.
- Supplier and customer confirm the effectiveness of the action plan (e.g., updates procedures, work instructions and training).
- Customer approves the resolution and closes the corrective action.

All communications must be carried out within the lead-time specified in the SCM agreement. It is recommended to use electronic communication (e.g., Web Based Tools, EDI, Web EDI, Web Portal) between the parties.

In order to communicate the incident information effectively, the customer and supplier agree upon a standard format for defining problem resolution (e.g. Problem Resolution Report (PRR), 8D, A3, etc.).

Each step can be adapted to individual company requirements.

3.1.1 Communication of Logistic deviation catalog

When an event occurs or is identified (e.g., logistics process deviation resulting in an impact on the customer, unsatisfactory communications), the customer is asked to classify the respective deviation in a corresponding category in the deviation catalog as described in Figure 2.

Each individual deviation should be provided to the supplier directly and in written form (electronically). It is recommended to deliver a standardized deviation report/problem report

with attachments (e.g. pictures) via a suitable technical tool (e.g. web-based application, email).

Before submitting the above-mentioned delivery data, the customer must ensure that the transmitted data is correct. When there are reported incidents, the customer must provide the option of dispute or correction of the measurement.

3.1.2 Communication of Delivery Accuracy

To understand the aggregated KPI for this category, it is necessary to provide the data for the individual part number and time periods as described below to the supplier. The results of this measurement are published to the supplier as each delivery is completed.

The data should include:

- Part number
- Order/Release ID
- Delivery ID/Shipment ID/ASN Number
- Supplier ID
- Target Quantity/Time
- Actual Quantity/Time
- Over shipment /Backlog quantity
- Final evaluation result (e.g. delivery accuracy OK or not OK)

4 USE OF KPIS FOR AUTOMOTIVE SCM

4.1 Development of a Supplier Scorecard:

Typically, an organization will use the results of these KPIs to develop a scorecard that is used to communicate performance results to its supply base. The scorecard will measure progress or achievement towards a set performance target. Analysis of scorecards over time will assist the organization in its supplier development activities, risk analysis and to assess the ongoing performance of the supply base. Internally the scorecards are used to measure performance against goals and objectives that have been set. It is recommended that scorecards be generated and provided to suppliers on a monthly basis.

Most organizations choose to express scorecard results using a maximum achievable score of 100, weighting each KPI. A typical scorecard could resemble the chart below.

		Maximum Points	Awarded Points
Delivery Performance		40	35
ASN Performance	Presence / Timeliness	30	25
	Accuracy		
Material Handling & Identification	Packaging	15	15
	Labelling		
	Delivery Documents		
Production Disruptions	Production Schedule Modifications		
	Incomplete Units	10	10
	Line Stop		
Supplier Cooperation		5	5
		100	90

Figure 5. A sample Scorecard

4.2 Use of a Weighted Average:

While a supplier scorecard provides a means of measuring performance over a specific period, it is recommended that performance over a longer period may be a better means to measure the overall performance. A weighted average can be used to measure performance over time (e.g. 6 months).

By using the following process, more account is taken of recent performance scores (suppliers are given credit for current performance improvements) and progressively less account for past performance.

A typical weighted average would be calculated as follows:

	Score	*****	**Weight Factor**	**=**	**Total**
Oct. 2019	74		6		444
Sept 2019	90		5		450
Aug 2019	87		4		348
July 2019	85		3		255
June 2019	85		2		170
			20		1667

Weighted average is calculated by dividing the Total Score by the total of the Weight Factors.

In this example the weighted average would be 1667/20 = 83.4.

5 . CONCLUSION

This document is developed as a recommendation for the evaluation of supply chain performance. A targeted control of common improvement measurements supports delivery performance throughout the supply chain.

The evaluation of the delivery performance is divided into two components, deviation catalog and delivery accuracy measurement.

- The deviation catalog allows a simplified recording of incidents into standardized structured categories.
- The delivery accuracy measurement identifies whether the required quantity has been delivered at the required date/time. Deviations are recorded according to the delivery conditions specified in the supplier agreements.

APPENDIX

Appendix A - Delivery Accuracy

Requirement

The supplier must be in compliance with the customer's ship/receipt schedule based on the quantity required through each shipment or through the total quantity required at the end of a period. The customer will report schedule non-adherence to the supplier on a specific day and time. For example, immediately upon receipt of the ASN, at a specific time daily, weekly, monthly, etc. The result of this metric will indicate that the supplier is either:

- Up-to-Schedule
  - When the quantity shipped by the supplier matches the quantity scheduled by the customer.
- Under-ship-to-Schedule
  - When the quantity shipped by the supplier is less than the quantity scheduled by the customer.
- Over-ship-to-Schedule
  - When the quantity shipped by the supplier is greater than the quantity scheduled by the customer.

Note: Can use either Ship Schedules or Receipt Schedules.

In specifically defined cases, an acceptable tolerance range (plus or minus to the requirement) may be applied to the measurement calculation as deemed necessary by the customer. The following are examples:

- Over-shipped due to standard pack quantity
- Over-shipped to fill a conveyance

The KPI compares the time period, part and quantity that was reported as shipped by the supplier to the customer's ship schedule. Schedule adherence can be measured either by cumulative or discrete quantities.

Calculation of the KPI

In order to be able to draw a conclusion from the measurement of the delivery accuracy per part number per measured time period, the determined basic data must be aggregated to a percentage:

$$Delivery\ accuracy\ [\%] = \frac{\sum delivers\ accurate\ time\ \ periods}{\sum of\ all\ measurement - relevant\ time\ periods} \times 100\%$$

The calculation is shown in the following example:

		Period 1	Period 2	Period 3	Period 4	Period 5	Ø Period
		Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Ø per week**
Part 1	Target quantity	100	100	0	0	100	
	Actual quantity	100	50	0	50	100	
	Overship/backlog	0	-50	-50	0	0	
	Delivery accuracy	**1**	**0**	**–**	**0**	**1**	(1+0+0+1)/4 = **1/2 = 50%**
Part 2	Target quantity	100	100	0	0	100	
	Actual quantity	100	200	0	0	0	
	Overship/backlog	0	100	100	100	0	
	Delivery accuracy	**1**	**0**	**–**	**–**	**0**	(1+0+0)/3 = **1/3 = 33%**
Part 1+2	Delivery accuracy	(1+1)/2= **100%**	(0+0)/2= **0%**		0/1= **0%**	(1+0)/2= **1/2 = 50%**	(1+0+0+1+1+0+0)/7= **3/7 = 43%**

Figure 6: Evaluation Example of Delivery Accuracy – Example 1

In principle, the aggregation can take place for one, several or all part numbers of a supplier for any period (day, week, month, quarter, ...). It is recommended that at least the following key figures are displayed: "All part numbers of supplier location x compared to customer location y in month z".

Delivery accuracy performance is measured against the release information issued by the customer. Typically, the methods of issuing release information would include the EDI messages DELFOR/DELJIT, 830/862. Specific information transmitted may vary by customer. It is possible that certain customers will transmit specific reference numbers (Kanban No, Sequence No, Delivery Note No, RAN No, order no, etc.) in order to indicate the required sequence of arrival of parts. In these cases, the sequence of the parts could be part of the delivery accuracy measurement.

The following example describes the calculation of the Delivery Accuracy for two part numbers, for deliveries identified and expected under sequence numbers An, Bn.

		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Part 1 Release Quantity = 5 Boxes X 10 parts per Box (50)	Delivery / Sequence release	A0, A1	A1, A2, A3	A1, A3, A4, A5	A1, A4, A5, A6	A4, A6, A7	A7, A8	A9
	Delivery / Sequence expected this day	A0	A1, A2	A1*, A3, A4	A1*, A4*, A5	A4*, A6	A7	A9
	Delivery / Sequence received this day	A0 (5X10)	A2 (5X10)	A3 (5X10) A4 (5X10)	A1 (5X10) A5 (5X10)	A4 (1X10) A6 (5X10)	A7 (5X10) A8 (5X10)	A9 (5X10)
	Time Slot	NOK	OK	OK	OK	OK	OK	OK
	No. of Deliveries expected or received	1	2	3	3	2	2	1
	No. of deliveries received "Not OK"	1	1	2	2	1	1	0
	No. of deliveries received "OK"	0	1	1	1	1	1	1
	Delivery Accuracy %	0/1 = 0%	1/2 = 50%	1/3 = 33%	1/3 = 33%	1/2 = 50%	1/2 = 50%	1/1 = 100%
Part 2 Release Quantity = 1 Boxe X 20 parts per Box (20)	Delivery / Sequence Release	B0, B1, B2	B1, B2, B3	B3, B4, B5	B4, B5, B6	B5, B6, B7	B6, B7, B8	B8, B9
	Delivery / Sequence expected this day	B0	B1, B2	B3	B3*, B4	B3*, B5	B6, B7	B8
	Delivery / Sequence received this day	B0 (20)	B1 (20) B2 (20)	B3 (10) BX (20)	B4 (20)	B3 (10) BX (25)	B6 (20) B7 (20)	B8 (20)
	Time Slot	NOK	OK	OK	OK	OK	OK	OK
	No. of deliveries expected or received	1	2	2	2	2	2	1
	No. of deliveries received "Not OK"	1	0	2	1	2	0	0
	No. of deliveries received "OK"	0	2	0	1	0	2	1
	Delivery Accuracy %	0/1 = 0%	2/2 = 100%	0/2 = 0%	1/2 = 50%	0/2 = 0%	2/2 = 100%	1/1 = 100%
No. of deliveries expected / received per day		2	4	5	5	4	4	2
Cumulative number of deliveries		2	6	11	16	20	24	26
Total number of "Not OK" deliveries		2	1	4	3	3	1	0
Cumulative number of "Not OK" deliveries		2	3	7	10	13	14	14
Daily Delivery Accuracy %		**0%**	**75%**	**20%**	**40%**	**25%**	**75%**	**100%**
Cumulative Delivery Accuracy %		**0%**	**50%**	**36%**	**38%**	**35%**	**42%**	**46%**

* late or incomplete delivery

Figure 7: Evaluation Example of Delivery Accuracy – Example 2

In this particular case, where a specific reference number is used, the decision as to whether a delivery is "OK" or "Not OK", is based on the following rules:

- If the shipment is delivered outside the appointed time-slot, or to the wrong location, or has an incorrect reference number the delivery is considered to be "Not OK"
- If the shipment is not delivered or incomplete, the shipment is considered "Not OK" and remains past due. As long as the shipment has not been delivered, it is considered "Not OK" each day until it is delivered.
- If the shipment is over-shipped or earlier than scheduled, the shipment is considered "Not OK" only on that day.

Figure 8 shows the "OK" and "Not OK" decisions for each delivery within Example 2.

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Part Number 1	**1 Not OK** - correct release and quantity received **BUT** outside the time slot	**1 OK -** Release A2 received correctly. **1 Not OK** - Release A1 not received	**1 OK** - Release A3 received correctly. **2 Not OK** Release A1 still not received and Release A4 received short on quantity	**1 OK** Release A5 received correctly, **2 Not OK** - Release A1 received 2 days late and remainder of Release A4 still not received	**1 OK** - A6 received on-time and correct quantity, **1 Not OK -** remainder of Release A4 received 2 days late	**1 OK -** A7 received on-time and correct quantity, **1 Not OK** - Release A8 received too early	**1 OK** - Release A9 received on-time and correct quantity
Part Number 2	**1 Not OK** - correct release and quantity received **BUT** outside the time slot	**2 OK** - Releases B1 and B2 received on-time and correct quantity	**2 Not OK** - Release B3 under delivered on quantity and unexpected receipt of unknown Release BX	**1 Not OK** Remainder of Release B3 still not received, **1 OK -** Release B4 received on-time and correct quantity	**2 Not OK** - Remainder of Release B3 received in full 2 days late **AND** Release B5 received on-time but in excess of requested quantity	**2 OK** - Releases B6 and B7 received on-time and correct quantity	**1 OK** - Release B8 received on-time and to correct quantity

Figure 8: Delivery Failure Explanation Table

Appendix B - Material Handling and Identification

A. Packaging specification

Three categories of incidents can be checked:

A1. Failure to comply with packaging design

This category covers all the supplier's discrepancies from the packaging agreement e.g.:

- incorrect packaging used
- unauthorized alternative packaging
- incorrect palletization

A2. Failure to comply with quantity

This category covers all the supplier's discrepancies from the packaging agreement on the quantity of parts e.g.:

- non-conformity with standard packaging quantity
- weight over/under tolerance

A3. Failure to ship product using clean, undamaged or safe packaging

This category covers all packaging discrepancies related to problems of cleanliness, damage or safety e.g.:

- the packaging is dirty
- the packaging is damaged
- the packaging presents a danger to people or product

B. Labeling specification

Three categories of discrepancies can be checked:

B1. Poor readability

This category covers all discrepancies relating to problems with reading labels e.g.:

- bar code cannot be scanned
- label is not located correctly on the package
- label is damaged

B2. Mislabeling

This category covers all discrepancies where the data on the label do not match the physical delivery e.g.:

- incorrect quantity indicated

- incorrect part number

B3. Non-conforming label, or data missing

This category covers all discrepancies where the label is not compliant with the agreement or a standard:

- not compliant with customer standard, such as Global Transport Label or customer specific standard

C. Delivery documents specification

Five categories of discrepancies can be checked:

C1. Accuracy of data

This category covers all data accuracy discrepancies that generate an incident during the receiving process. The data that can be checked are identical to the EDI indicators, e.g.:

- purchase order is missing
- incorrect part number

C2. Quantity delivered is different from the quantity on the delivery note/packing slip

This category covers all incidents where the quantity indicated on the delivery note/packing slip does not match the physical quantity delivered.

C3. Parts delivered without delivery note/packing slip

This category covers all incidents where parts are delivered without reference to a delivery note/packing slip or an order.

C4. Conformity with the specification

This category covers all incidents where the delivery note/packing slip does not match the delivery note/packing slip specification defined in the SCM requirements.

C5. Specific document missing

This category covers all incidents where a specific document described in the SCM requirements is missing when goods are delivered e.g.:

- certificate for steel
- traceability (e.g. batch number)

D. Loading/ specification

Two categories of non-conformities can be checked:

D1. Conformity with loading specification

This category covers all incidents where the loading specifications do not comply:

- rack or pallet cannot be unloaded
- rack or pallet is not correctly located in the trailer, etc.

D2. Conformity with safety specification

This category covers all incidents where the safety specifications do not comply:

- hazardous loading
- non-compliance of the delivery driver to the Customer's internal traffic flow, etc.

Appendix C – Glossary

Term	Definition
AIAG	Automotive Industry Action Group - A trade association working to increase member productivity through a cooperative effort of North American vehicle manufacturers and their suppliers.
Advanced Shipping Notice (ASN)	An EDI transaction listing the contents of a shipment of goods as well as additional information relating to the shipment including order information, product description, physical characteristics, packaging type, marking, carrier information, and configuration of goods within the transportation equipment.
Customer	OEM (Original Equipment Manufacturer) or supplier who is responsible to order the parts and materials.
Electronic Communication	Conducting business electronically via traditional EDI technologies or online via the Internet.
Electronic Data Interchange (EDI)	The computer-to-computer exchange of formatted data between trading partners in a standard format and syntax, e.g., ANSI, ASCX12, or UN/EDIFACT.
Incoterms	Incoterms are an internationally recognized set of instructions used in the global transportation of goods.
Kanban	A pull replenishment system used at a stock point in which a supply batch is ordered based on the usage of a previous batch.
Key Performance Indicator (KPI)	A performance measure (metric) used by the Organization to determine its current performance and identify improvement targets.
	KPIs should follow the **SMART** principle, i.e.:
	Strategic
	Measurable
	Achievable
	Realistic
	Timely.
Lead Time	1. The time interval between the concept or design of a product and its actual production.
	2. The time interval between the placing of an order and the delivery of the product or service.

Term	Definition
Materials Management and Logistics	The process of planning, implementing, and controlling the efficient, effective flow and storage of goods, services, and related information from point of origin to point of consumption for the purpose of conforming to Customer requirements.
Global MMOG/LE	Materials Management and Operations Guideline Logistics Evaluation. Global MMOG/LE has been developed jointly by Odette and AIAG as a unique Supply Chain Management capability assessment tool that can be used throughout the automotive industry as well as across other industry sectors.
ODETTE	Organization for Data Exchange by Tele-Transmission in Europe - a pan-European collaboration and services platform working for the entire automotive network.
OEM	Original Equipment Manufacturer
Plant	A manufacturing location.
PPM	Parts Per Million
Point of fix	The physical point at which the part is consumed (e.g., assembly).
Receipt Discrepancies	Variance between documented receipts and physical receipts.
Release	An order of material against a blanket purchase order. A release tells the supplier what, when, how much, and to whom to ship. Some common EDI documents used for releasing are the X12 830, the EDIFACT DELFOR, DELJIT and the X12 862.
Self-Assessment	A method by which a facility or Organization compares actual methods/performance to an ideal.
Service Parts	Parts used for the repair or maintenance of an assembled product. - Also known as replacement parts, repair parts, spare parts.
Tier	The level of Supplier (Organization) in relationship to the OEM/VM final assembly plant.
Tier 1	Supplier/Organization that supplies parts directly to the OEM/VM final assembly plant.
Tier n	A supplier to the Tier 1, either directly or indirectly.
Traceability	A precise degree of documented history regarding the life of an entity, such as a lot of material, including activities performed and components used.

Term	Definition
Vendor Managed Inventory (VMI)	The practice of Customers making Suppliers responsible for determining order size and timing usually based on receipt of inventory data. Its goal is to increase inventory turns and reduce stock outs.

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