

EFFICIENCY ANALYSIS OF SUPPLIER PERFORMANCE MEASUREMENT SYSTEM

Csanád SIPOS*

Department of Engineering Management, Faculty of Engineering, University of Debrecen
Ótemető u 2-4., H-4029 Debrecen, Hungary, e-mail: csanad.sipos@gmail.com

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Abstract: This study empirically investigates the effects of the special, face to face supplier performance measurement system. Using supplier performance measurement system the supplier will have the possibility to make a self-assessment method through questionnaires according to different aspects. The customers make the same queries. After ranking from both sides, the results will be compared and confronted with the supplier. The effects on different areas and the nexus with supplier in the aftercare period will be examined in this study. The relation between the communication and reaction modes at the procurement side is deeply discussed.

Keywords: Procurement, Supplier evaluation, Performance, Self - assessment, Logistics

1. Introduction

The new generation will grow in a world that is characterized by almost real-time information flow and fast flow of people, goods and services. The ‘digital native’ generation will not feel the differences between real and virtual collapse and will navigate much more differently and more accurately between spheres that are more and more closely aligned with each other than previous generations. Individual products, events, nations, phenomena and individuals are becoming more and more closely related, dependent on each other, and interacting more than ever.

As a result, almost all processes take place much faster. The smallest time loss can also be the choice between success and failure. Nowadays the importance of

* Corresponding Author

information is speeding. With the help of the Internet, the acquisition of this information is not a question, only the achievement and speed of that information is a great advantage for companies. As long as companies have delivered their orders to suppliers by letter, fax or e-mail, today, through the online Electronic Data Interchange (EDI), supply-on or other management system, the supplier can see in real-time the demand for that customer order component therefore the supplier can react immediately [1].

With the development of new technologies, the globalized, interconnected world allows us what we have done so much more efficiently and sustainability. [2]

2. The challenge and the solution

2.1. Complexity and flexibility

In the aircraft industry the components' complexity is visible. One aircraft depending on a model and type may consist of 500,000 - 5 Mio parts. Boeing 787 Dreamliner is assembled by about 1,000 workers in a factory in Everett, Washington [3].

The wings are made in Japan, the horizontal planes in the Italian Foggia, a part of the doors in Sweden, the wing holes in Korea, the cockpit seats in United Kingdom, and a part of the interior is made in Nyírbátor, Hungary [4]. The detailed location of the parts is shown in *Fig. 1*.

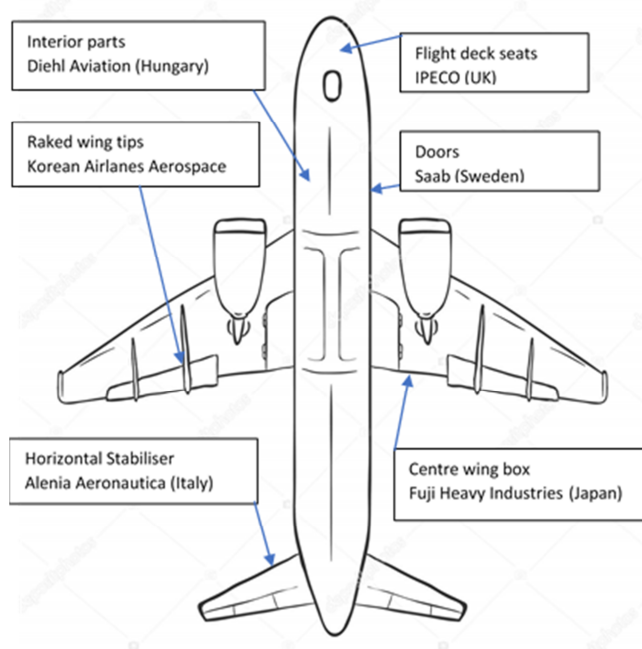


Fig. 1. Suppliers of Boeing 787 Dreamliner (Source: Author)

Like most products that are bought and used, Dreamliner is also a product of a huge resource network. However, the increasing interdependence of the physical production of products is nothing compared to the leap that having been witnessed over recent years in digital connectivity.

Boeing's efficiency is increased by the outsourcing of sub processes, but processes affecting several dozen countries in several continents are fragile. A successful assembly of an aircraft or other complex machines depends not only on the integrity of some factories and suppliers, but also on the safety of ocean routes, working conditions, natural catastrophes, the stability of exchange rates and the flexibility of supply chain management.

With crowdsourcing and virtuality the network of available suppliers will be wider.

2.2. Solution

The industrial companies are generally mistaken in focusing on their own internal processes, developing them. This improvement is harmonized with the customer requirement and only in the middle and end of the supply chain is concentrated. Few companies cross functional overview and supplier-oriented purchasing [5], there is not enough emphasis on the beginning of the supply chain. In fact, the first and most important step begins with suppliers. If they are not prepared for just in time delivery or other scheduled deliveries, then the internal process improvement does not make sense. The high quality of the product must keep from the raw or purchased material. If from the external source the semi-finished parts or a material is delivered with small defect or it is not in required condition, then those mistakes will be built in the finished product. The operations must be tuned together between the manufacturer and the strategic supplier.

Traditional supplier performance measures may limit the possibilities to optimize supply chains as the management does not 'see' wide areas for improvement. This note raises issues critical to measuring this performance. A new measurement approach should lead the way to supply chain competitiveness and should direct management attention to areas for future optimization [6].

This communication is possible in several ways. The widespread and most commonly used one is a yearly or regular supplier evaluation letter, but this is only almost one-way communication. For suppliers it is very important to have not only a feedback but also a support or continuous guidelines [7].

Measuring the suppliers' performance helps companies to focus on resources on value added activities instead of reacting to supplier-induced problems (defects, late deliveries to customer, work stoppages, reduction of market competitiveness etc.) [8].

In annual evaluation several parameters can be measured:

- Number of complaints;
- Other quality parameters;
- Delivery performance;
- Quantity performance;
- Packaging performance;
- Other logistics parameters.

One example is presented in *Table I* for annual supplier performance measurement system where is analyzed the main viewpoints.

Table I

Suppliers' evaluation (Source: Author)

Received goods		Number of complaints	Quality evaluation	Delivery performance	Quantity performance	Logistics evaluation	Overall supplier evaluation	
Pcs.	Quantity							
26	215 856	0	100	80	76	78	92.30	A
Previous ranking:			A					

According to the classification the supplier can reach following points:

- *A - Supplier (100 to 90):*
Best suppliers, with a best performance no further feedback is required.
- *AB - Supplier (<90 to 80)*
Good suppliers, only internal measures are needed that need not be communicated to the customer
- *B- (<80 to 60) or C- Supplier: (<60)*
In a short time frame, a written action plan is needed to identify the tools and plan to improve the processes.
- *C- Supplier: (<60)*
Suppliers with bad metrics it is needed to find an alternative supplier and need to be replaced in a short time.

After this information is not or only in case when the supplier achieves bad ranking then is expected any feedback or action plan. This is almost one-way communication, with only a low level of feedback [9].

3. Supplier performance measurement system

Supplier Performance Measurement (SPM) system is a new level of the cooperation with strategic-partners because the supplier receive continuous feedback and defined way of improvement. This is a new evolution of performance measurement system, which can be extended in a whole supply chain [10].

3.1. System structure

The structure of SPM system concentrated not only in one area, many functional parts and almost all important processes are analyzed and checked. The following Departments are under the scope in the SPM system:

- Quality;
- Logistics;
- Cost structure;
 - Quotation process;
 - Savings/cost compliance;
- Improvement;
 - Competence of supplier;
 - Technical equipment of supplier;
- Production;
- Customer Satisfaction;
 - Customer orientation and flexibility of supplier;
 - Contracts and other documents of supplier;
- Risk factors.

After the analyses the supplier can see a clear picture about their own processes.

3.2. Specific question of logistics parts

The logistics section represents one of the most important parts of inter-organizational discussion [11].

Question of logistics;

1. Logistics quality: Was the supplier the cause of special trips to company or customers due to logistics errors, quality defects, production failure?

Evaluation:

- 10 point = if no special trips needed;
- 1-9 point = special trips without a production time stops;
- 0 point = special rides with stoppage.

2. Capacity management: How does the supplier (including its subcontractors) comply with promised production capacity? How flexible is their response to fluctuations in demand, especially demand peaks?

For example:

- Capacity check;
- Flexible working hours;
- Special shifts.

Evaluation:

- 10 point = requirements fully met;
- 8 point = predominantly fulfilled; minor deviations;
- 6 point = partially fulfilled; major deviations;
- 4 point = insufficiently fulfilled; serious deviations;
- 0 point = not satisfied.

3. Electronic communication: Does the supplier use electronic procedures like dial-up connection, WEB-EDI, Vendor Managed Inventory (VMI) or are they willing to do so at the request of the buyer company?

Evaluation:

- 10 point = active use of WEB-EDI, or other electronic communication system;

- 6 point = other dial-up connection active;
 - 4 point = readiness available;
 - 0 point = no connection active.
4. Warehousing: Is the supplier prepared to set up a consignment warehouse or Kanban at the request?
- Evaluation:
- 10 point = experience with other customers, already in use;
 - 6 point = experience with other customers, willingness available;
 - 4 point = no experience, but willingness available;
 - 0 point = no readiness.
5. Packaging development: Does the supplier independently suggest solutions for packaging of the products?
- Evaluation:
- 10 point = high initiative, very good proposals;
 - 4 point = no initiative, only under customer pressure;
 - 0 point = no initiative, no own suggestions.
6. Packaging and product labeling: Is the labeling of products and the labeling of packaging in accordance with the buyers specifications and requirements?
- For example:
- details of type, part number, batch, etc;
 - Barcode label;
 - Radio Frequency IDentification TAG (RFID TAG).
- Evaluation:
- 10 point = requirements fully met;
 - 8 point = predominantly fulfilled; minor deviations;
 - 6 point = partially fulfilled; major deviations;
 - 4 point = insufficiently fulfilled; serious deviations;
 - 0 point = not satisfied.

3.3. Operation

Using this system the supplier will have the possibility to make a self-assessment method through questionnaires according to different aspects. (Quality, Logistics, Cost Structure, Improvement, Production, Customer Satisfaction, and Risk factors). The customers make the same queries.

It is important to make this evaluation separately, and as there is not too much time between evaluating the two sides because it can distort the values. After ranking from both sides the results will be compared and confronted with the supplier. This deeply common analysis of results and deviation is needed in a framework of a personal consultation. In mail communication it is not effective to clear the results, why the supplier got so many points on that question line. After the evaluation from both sides the differences in each area can be seen quickly and clearly as it can be seen in *Table II-Table IV*, or as it is shown in a grid diagram of common areas in *Fig. 2*.

Table III

Suppliers performance analysis details (Source: Author)

Improvements																				
Evaluation elements	Fulfillment																			
	(%)																			
Supplier side Competence	97																			
Buyer company side Competence	80																			
Supplier side Technical equipment	85																			
Buyer company side Tech. equip.	80																			
Supplier side Costs	90.8																			
Buyer company side Costs	80																			
Production																				
Evaluation elements	Fulfillment																			
	(%)																			
Supplier side Production	90																			
Buyer company side Production	85																			
Customer satisfaction																				
Evaluation elements	Fulfillment																			
	(%)																			
Supplier side Customer orient./flexibility	94																			
Buyer company side cust. orient.	77																			
Supplier side contracts & documents	80																			
Buyer company side contracts	80																			
Supplier side Cust. Satisf.	87.1																			
Buyer company side Cust. Satisf.	78.6																			

The supplier can see a better picture from his own departments, processes and daily work, but on the other side the buyer company can show the way where improvement can be found and where it is needed.

This SPM measurement is essential to make every half a year or latest yearly, to check if the improvement is in the right direction or not. The continuous communication can help to develop an appropriate partnership in which the suppliers feel care and the possibility of a long-term cooperation.

Table IV

Suppliers performance analysis details (Source: Author)

Risk factors		Fulfillment (%)									
Evaluation elements	Fulfillment (%)										
Supplier side Insurance	60	■									
Buyer company side Insurance	40	■									
Supplier side External risk	96	■	■	■	■	■	■	■	■	■	■
Buyer company side External risk	92	■	■	■	■	■	■	■	■	■	■
Supplier side Risk factors	78	■	■	■	■	■	■	■	■	■	■
Buyer company side Risk	66	■	■	■	■	■	■	■	■	■	■
Total result		Fulfillment (%)									
Supplier side Total result	85.4	■	■	■	■	■	■	■	■	■	■
Buyer company side Total	72.5	■	■	■	■	■	■	■	■	■	■

Half-year after the first SPM the second SPM results shows significant change. The largest upswing was in terms of insurance, flexibility, competence of suppliers and quality. In case of production and technical equipment in the first measurement there was a difference and half a year later by the second round there was the same score on both sides.

From the results it is clear that the system can fill the actual communication gap between the customer and the supplier.

As suppliers take on more important roles in manufacturing and designing products, their operational innovativeness becomes an important source of value [13].

In the past, commonly used supplier evaluative criteria have focused on quality, service or delivery, and price. In recent years, the channels literature has indicated other areas, like relationship factors, external risk, insurance [14]. This method can be support the supplier selection problematic of the logistics. When one product ordered in a given quantity, but only one supplier cannot provide all of the ordered quantity because of lack of capacity, and more suppliers have to involve is described [15]. Implementation

and adaptation in the other direction of logistics for example on the transport companies, in a long-term target are the optimal input/output structure [16].

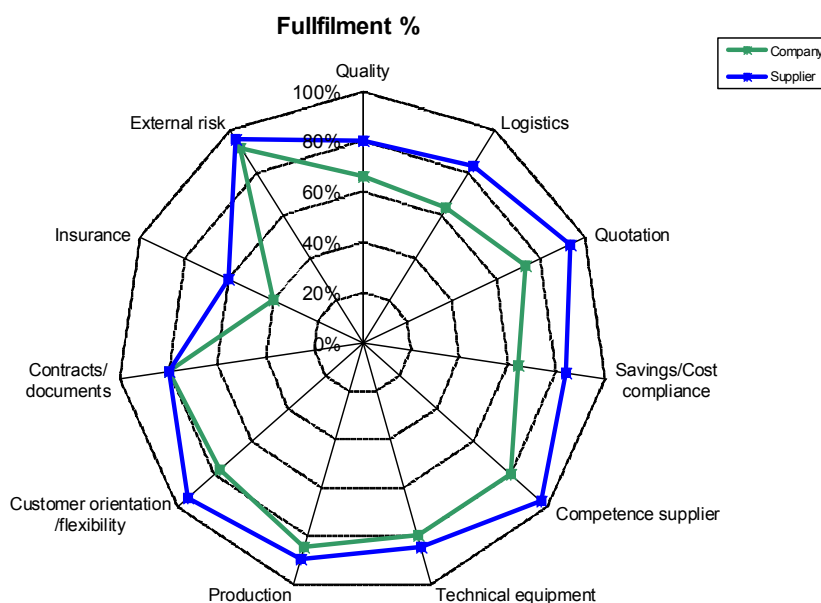


Fig. 2. Suppliers performance comparison (Source: Author)

4. Conclusion and future steps

The development of the SPM system was preceded by a longer research and field-by-field consultation, when the final version was developed, with which a comprehensive, cross-departmental study could be conducted. The results clearly show the future direction of development.

In all industrial, non-industrial, service sectors there is a need for supplier evaluation, but it is necessary to set up a company or area specific evaluation criteria and system separately.

This supplier performance system has been started in the industrial sector. It is only filled for strategic suppliers. It makes no sense for those suppliers with whom the company is not planning in the long term, as it is very time consuming to prepare.

Next steps:

- In a short term-period more data and result is needed to have a clear picture how the SPM system can be optimized;
- In a middle term-period it will be useful to make a different second round questioners to have a higher level of cooperation with strategic partners;

- In a longer term-period it is possible to make an industrial sector specific SPM system (for example: Food industry in focus on hygiene, in service sector focused on a customer satisfaction, in pharmaceutical industry focused on a healthy and safety work with a traceability).

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