

RANKING AND EVALUATING NEW ASIAN SUPPLIERS WITH EUROPEAN SUPPLIERS BASED ON PERFORMANCE CRITERIA

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Abstract. The scope of this article is to select, monitor, improve, and reward new suppliers' performance. The firm's management has decided to extend its suppliers activities in Far East and Turkey. Supplier Quality Engineering Team evaluates all new suppliers. The new suppliers should provide necessary documents (Quality Survey, Financial Statements, Assessment Report, and other requested documents) to the Supplier Assessment Team. Then, possible suppliers are evaluated and ranked with the firm's Supplier Assessment criteria. After evaluation, information will be set and used. Asian and European suppliers are evaluated in district manner. European suppliers were examined to create new suppliers data system. The new ranking system will be used by headquarter and sub-firms.

Keywords: supply chain, supplier evaluation, supplier rating, supplier assessment team, supplier performance monitoring process.

Jel classification: M10, M11, M16

1. Introduction

The firm is located in Germany and the main producers of windows and door setting over 100 years in the World. Its mission is to provide worldwide variety of a complete range of construction fittings and security equipment for windows and doors at highest quality. This case study was prepared while working in the firm during 2006-2007. The firm will use this system in next 20 years by changing and improving the system according to requirements. The Supplier Engineering Team from Far East was invited to the head quarter and next 5-10 years plans of the firm were explained to them. Their main responsibility is to find suitable suppliers for outsourcing. The firm makes contracts with suppliers for 5-10 years based on investment done by the firm and suppliers performance. The main task of this article is to measure the supplier performance and to prepare rating for them. The existing system used, supplier in Far East, Europe and Turkey were analyzed from their data and past history. The workers from production, sales and engineering department stated their opinions about suppliers in headquarter. These informations are inputs to establish supplier performance measurement system. Suppliers can be visited at their firm by engineering team. Photos of the firm can be taken to help the evaluation in order to remember the firm for reporting and then

make documentation to the supervisors in Far East and Germany. These documents should be sent to headquarter in order to be saved in suppliers' database.

This era has witnessed many changes. Globalization and business with no border are the main thrust of these changes. Now, every business is under threat of competition from close or far countries. New players such as China, India, Turkey and Thailand are trying to increase their exportation rate. Especially China with huge potential of labor force seems in front of others. Old and developed European industry is expensive for many costumers now since they are competed even in their market with cheaper production. Cost aware costumers prefer cheap ones better than expensive ones and middle income level costumers do not need to wait for a long time to buy their wishes. They can buy cheaper in shorter time. Instead of waiting, few years to buy a good machine, they go and buy a cheap one made in Far East. These deep changes have forced many German firms for outsourcing. The firm is at back stage of other big firm and even they are not willing to change their suppliers, competition is forcing them to do that.

The firm's management has stated in a presentation in 2007 that they want to increase suppliers' activities from current 5 % up to 25 % in Asia mainly by changing or decreasing its activities from current European and close countries suppli-

ers to Asian suppliers or increasing its market share. A new headquarter was opened in 2005 in China and they have opened sub-firms in other cities. They have some new suppliers already in China and Thailand. It is expected to create a supplier database based on their performance. They have monitored suppliers' performance based on their delivery and quality requirements. This category was used mainly for European suppliers. European suppliers are mainly good and visited regularly but their production cost is expensive and this forced the firm to find new cheap suppliers in Asia. The competitors of the firm have already created their channels in Asia. It was seen that it is unavoidable to stay in border of current supplier portfolio.

The current competition is based on cost reduction. This can be done either optimizing current processes or making different outsourcing in far countries. Optimization will be a good strategy to decrease costs up to a point. This needs also some investments and resources. However, starveling Asian suppliers are waiting for cheap production; this can be up to 60-70 % cheaper than their European competitors. There are some disadvantages such as low quality, being far, different mentality etc. but these disadvantages can be covered in time. The main of supplier rating is to minimize these disadvantages. It was seen that many new suppliers may not meet these criteria and they need the help of firm. The firm decided to improve the performance of suppliers with whom they think that they may make long term business. The firm employed a supplier engineering team in headquarter to follow the suppliers and help them to meet firm's requirements. High German standards are not easy to be met and it may take time. Automation is less used and labor force is the main usage of production. So, every procedure should be redesigned for new suppliers. This study shows how to rate and monitor suppliers in long term. Moreover, this new system means some costs for the firm and the huge outsourcing amount of the firm is considered, this cost will a tiny portion of all costs and it is worth to make this kind investments.

2. Theoretical background

In today's competitive business world, companies have been forced to satisfy customers who have various demands such as more variety, cheaper and better quality of product and quick delivery (Nobar *et al.* 2011). To survive in such an environment a company cannot behave as an independent unit rather as an integral part of a whole which called as supply chain (Lu *et al.* 2011).

Supply chain is identified as an integrated process including a number of business parts works together to product for customers (Wanga, Shub 2005).

Also there are a number of parameters that affect the final cost of product, the most important and remarkable one is the price of raw materials and component parts. In the condition of the cost of raw materials or component parts dominates the product cost, supplier selection becomes crucial for the company to maintain or lower the cost while keeping product quality (Wu *et al.* 2008). In most industries the cost of raw materials and component parts dominates the main cost of a product, such that in some cases it can account for up to 70 % (Kilincci *et al.* 2011).

Supplier selection is very important for a company because wrong supplier selection may cause the company to fail in terms of financial and operational position. On the other hand with selecting the right one, company drastically would be able to decrease the product cost, to gain power to compete in the market and to increase customer satisfaction (Önüt *et al.* 2009). Selecting suppliers is no longer an operational function but a strategic level decision and an important goal in supply chain management (Crama *et al.* 2004; Lin 2009; Kahraman *et al.* 2003; Ding *et al.* 2005; Lasch, Janker 2005).

In literature there are many papers about supplier selection. Some of them focus on selection criteria while some of them reveal the selection process and rest of them give methods and procedures support supplier selection (Nobar 2011). Supplier evaluation and selection is considered as a complex problem because of the number of criteria and their interdependence (Sreekumar, Mahapatra 2009). According to many papers those appropriate criteria are suggested to be considered to select supplier: cost, quality, time, delivery, and reliability (Agarwal, Vijayvargy 2011).

Being one of preliminary in this field of study, Dickson (1966) identified 23 different criteria for supplier selection including quality, delivery, performance, warrant and claim policy, production facilities and capacity, net price, and technical capabilities. Rao and Kiser (1980) determined 60 criteria for supplier selection. Timmerman (1986) proposed cost-ratio method which picks up all costs related to quality, delivery, and services and shows them as positive or negative contribution percentage on unit price. Bache *et al.* (1987) identified 51 criteria for supplier selection. Weber and Current (1993) presented an integer model with multi-objective approach to supplier selection. Ghodsypour and O'Brien (1998) suggested an integrated model which includes both tangible and

intangible factors in choosing the best suppliers. Cebi and Bayraktar (2003) proposed a supplier selection model including both quantitative and qualitative conflicting factors. Wangetall (2004) also presented a model based multi-criteria decision-making methodology taking into account both qualitative and quantitative factors in supplier selection. Wang and Yang (2009) presented a supplier selection model in a quantity discount environment using multi objective linear programming, analytic hierarchy process (AHP), and fuzzy compromise programming. Amin *et al.* (2011) composed both fuzzy logic and quantitative SWOT for the first time.

Ho *et al.* (2010) reviewed the literature on the multi-criteria decision making approaches for supplier evaluation and selection from 2000 to 2008. They observed that price or cost is not the most widely adopted criterion. Instead, the most popular criterion used for evaluating the performance of suppliers is quality, followed by delivery, price or cost, and so on.

3. Evaluation of suppliers

Xia and Wu (2007) suggested that basically there were two kinds of supplier selection processes.

Single sourcing: Constraints are not considered in the supplier selection process. In other words, all suppliers can satisfy the buyer's requirements of demand, quality, delivery, etc. The buyer only needs to make one decision, which supplier is the best.

Multiple sourcing: Some limitations such as supplier's capacity, quality, and delivery are considered in the supplier selection process. In other words, no one supplier can satisfy the buyer's total requirements and the buyer needs to purchase some part of demand from one supplier and the other part from another supplier to compensate for the shortage of capacity or low quality of the first supplier. In these circumstances buyers need to make two decisions: which suppliers are the best, and how much should be purchased from each selected supplier?

An integrated optimized sale-logistics, production-logistics and purchase-logistics planning is a crucial part of the successes of as shown in Figure 1, which is mainly similar to the supply chain system of the firm explained in the text (Guo, Tang 2008). Without considering the customer expectations, the chain will not work effectively. The firm has its sales, production and logistics operations in Germany at headquarter, but its suppliers, manufactures (assembling parts as a finished product), and costumers are global. Each

country has its different life style and climate. The parts are mainly used in doors and windows. Hot climates and cold climates need different products to prevent corrosion. Finally, there is a need of integrated supply chain.

Supplier performance is critical for the firm. The firm wants to be a good customer of its suppliers and expects the same approach from them. The firm is aware of true cost due to poor supplier performance and quality. Supplier's performance should bring strategic competitive advantages. Supplier Quality Engineering Team evaluates all new suppliers. The new suppliers should provide necessary documents (Quality Survey, Financial Statements, Assessment Report, and other requested documents) to the Firm Supplier Assessment Team.

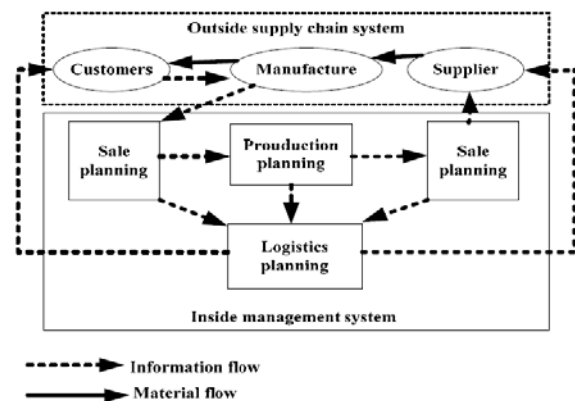


Fig.1. An optimized supply chain system

Then, possible suppliers are evaluated with the Firm Supplier Assessment Form. After evaluation, information will be set whether supplier is:

- Added to the firm's suppliers list or
- Another survey done or
- Additional information requested or
- Rejected

The existing suppliers are annually evaluated by the firm's Supplier Engineering Team. After evaluation, suppliers are approved as:

- a) These suppliers are given priority for sourcing decisions.
- b) These suppliers require the approval of Supplier Engineering Team's manager for sourcing decisions. They are restricted.
- c) These suppliers are deleted from supplier list of the firm.

Quality and delivery of products are prior requirements. Suppliers based on delivery requirements, Quality, CAR (Corrective Action Request) and Cost reducing/ prevention expectations, a status will be given. All suppliers will get a report of detailing performance of delivery per three

months. Furthermore, suppliers will get a report including quality rating per six months. Suppliers not meeting the expected quality rating will receive a report detailing non-acceptance products and CAR with responses expected and received. Supplier should use these reports as an improvement tool in the future. Suppliers will get a detailed Supplier Performance Rating Scorecard per year. This system is new and expected to be implemented in the future. Suppliers' rating is carried based on these criteria:

- Firm Rating (25 %)
- DRM-Quality (20 %)
- Delivery to Schedule (25 %)
- Number of CAR (10 %)
- Responding CAR and RFS (10 %)
- Cost Reducing (10 %)

The firm has measured the suppliers' performance by On-Time-Delivery (OTD) and number of orders rejected. A report of OTD was sent per 6 months. Suppliers were informed when order was rejected. At the end of year, a status based on these two criteria was given to each supplier.

3.1. Suppliers rating

New suppliers will be firstly graded based by Supplier Assessment Form and a grade will be given at beginning. The grade will play a critical role for the selection. The firm Supplier Engineering Team will audit existing suppliers annually. The team may give some suggestions to existing suppliers. After evaluation, existed suppliers systems will be re-graded. This grade will play an important role for later sourcing decisions by Purchasing Department. The data used for evaluation is not specific to a particular location. It encompasses all the firm facilities.

- a) *Preferred Supplier*: These Suppliers are suitable for all new and existed business.
 - 80 points and above Supplier Performance Rating
 - Submit valid Certificate of Registration to current ISO Standard
 - Achieve a minimum score of 85% on the supplier on-site the Firm Assessment (The supplier evaluated based on prepared criteria-related to production, management, etc.)
 - Supply quarterly SPC (Statistical Processing Control) charts on all identified critical characteristics per the firm's part number specification.
- b) *Approved Supplier*: There will not be any change in priority of new business.
 - 50 points to 79 points Supplier Performance Rating

- Achieve and continue to meet the firm's requirements for an Approved Supplier
- c) *Temporary Supplier*: An improvement plan will be put on these suppliers. If after six months, there is not any improvement, they will be excluded from new business.
 - 50 points or less Supplier Performance Rating
 - Achieve and continue to meet the firm's requirements for an Approved Supplier.

3.1.1. Scoring criteria:

This measurement is based on the most recent 12-month data. The details for each of the criteria are as follows:

- a) *Firm Rating*: Supplier Engineering Team will carry out firm rating and a grade will be given based on total assessment of the firm. The details of this rating are explained in this chapter. The firm rating is important for first selection of suppliers.
- b) *Defect Rate per Million (DRM)*: The firm adopted use of this calculation and utilizes this data as measurable. Supplier DRM is calculated by the number of parts rejected divided by the total number of parts received multiplied by 1,000,000. The DRM category is based on a 20-point scale as shown in Table 1.

Table 1. DRM rating

DRM	Points
0	20
1 to 50	18
51 to 100	16
101 to 150	14
151 to 200	12
201 to 250	10
251 to 300	8
301 to 350	6
351 to 400	5
401 to 500	4
501 to 600	3
601 to 750	2
751 to 1000	1
1000+	0

- c) *Corrective Action Request (CAR)*: Suppliers will get maximal 10 points from this part if no issues are reported by the firm during one year. Supplier will lose one point per each occurrence as shown in Table 2.

Table 2. CAR rating

Number of CAR	Points
0	10
1	9
2	8
3	7
4	6
5	5
6	4
7	3
8	2
9	1
10	0

d) Responding CAR and RFS (Report of First Sampling): The RFS and CAR response are another part of evaluation. The firm may expect from suppliers new RFS for new products or existing products on defined dates. Late answering RFS and CAR will decrease the supplier grade as shown in Table 3.

$$\text{Late RFS\&CAR (\%)} = (\text{number of Late RFS's, CAR's} / \text{Total received RFS's, CAR's}) \times 100$$

Table 3. Responding CAR and RFS rating

Percent of late RFS & CAR	Points
0	10
1 to 20	8
21 to 40	6
41 to 60	4
61 to 80	2
81+	0

e) Delivery to Schedule: This category is based on 20 points scale as shown in Table 4. Delivery rate is calculated per three months. Numbers of on-time deliveries are divided to total number of delivery done by the supplier during that period. At the end of year, 4-period rolling average is carried out.

Table 4. Delivery rating

Percent of On-time Deliveries	Points
100	25
98.00 to 99.99	23
95.00 to 97.99	21
94.00 to 94.99	20
92.00 to 93.99	16
90.00 to 91.99	12
88.00 to 89.99	10
86.00 to 87.99	8
84.00 to 85.99	6
82.00 to 83.99	2
81.99 or below	0

f) Total Cost Reduction/Prevention: The total Cost Reducing Category is based on 10-point scale as shown in Table 5. A part of this category could be given as a bonus point. Total cost reducing will be reported to by suppliers to the firm purchasing annually by calculating total savings per year.

Table 5. Cost reduction rating

Percent of Total Cost Reduction	Points
5.00 minimum	10
4.00 to 4.99	9
3.00 to 3.99	8
2.00 to 2.99	7
1.00 to 1.99	5
0.02 to 0.99	3
0.00 to 0.01	2

3.1.2. Overall rating criteria

This part is to advise suppliers of the quarterly rating as a supply partner of the firm. As the firm's policy is continual improvement and win to win strategy, suppliers are expected to help to ensure maintaining high standards. Supplier rating system will be for benefit of both parties. It is advised that suppliers raise their score to outstanding level. It is not possible under 50 score to be the firm's supplier. In Table 6, the range of rating is shown.

Table 6. Rating results

Score (%)	RATING
90-100	Outstanding and exceeds expectations
70-89	Satisfactory and meets expected performance
51-69	Meets most expectations and needs some improvement with corrective action
26-50	Needs significant improvement with corrective action plan required
0-25	No system or process exists, immediate corrective action required

This evaluation will be done according to 100 % system. The values of each part will be summed and divided to maximum grade for this part and then, this value will be multiplied with 100.

For example: If maximum point for one group is 40 and supplier gets 30. Then coefficient will be 0.75 and then this value will be multiplied with

100. The result will be 75. Later this part will be multiplied with its priority factor. The same procedure will be done for all section. Later prioritized values will be summed.

A developed rating system modified from Kemp (2003) shown in Table 7 can be combined with that system to grade the supplier.

Table 7. Rating suppliers

No	Subsystem	Score	% Score	Weight	Weighted % Score
1	Quality System and Management		20		
2	Document Control		10		
3	Incoming Material Control		15		
4	Purchasing		10		
5	Inventory Control and Production Planning		10		
6	Process/Quality Control and Calibration		20		
7	Manufacturing Capability, Technology and Project Management		10		
8	Control of Nonconforming and Material and Corrective Action		5		
9	Final Inspection, Packaging and Delivery		5		
SYSTEM RATING					

4. Supplier performance monitoring process

The firm’s Supplier Quality Engineering and Purchasing are responsible for monitoring suppliers’ performance. Supplier Performance could be used by suppliers to initiate Quality Improvement Plan. Supplier development will be offered to achieve the firm’s goals. In quality, delivery, proactive problem solving and cost reducing, the firm expects a good performance from each supplier. The firm targets 100 % delivery performance. Not urgent deliveries may be reviewed by the firm Purchasing and Suppliers and late deliveries for these orders could be accepted. Suppliers have to eliminate any waste and non-value added activities to reduce the cost. Suppliers should monitor their performance and identify continuous improvement opportunities. The firm will provide a performance report annually based on the firm’s requirements.

The firm reserves its right to change suppliers’ status to lower level if suppliers fail meeting the firm’s requirements. If suppliers have any questions about categories stated in performance matrix, they should get in contact with the firm Supplier Quality Engineering and Purchasing representatives.

4.1. DRM supplier performance requirement

The firm tracks DRM performance and expects from suppliers to calculate their own data to track DRM internally to identify quality performance trends within their own processes.

$$DRM = (\text{quantity rejected} / \text{quantity received}) \times 1,000,000$$

Quality DRM defective reporting is based on the total shipment quantity and estimated number of rejects by using statistics, unless the product is screened. Otherwise, the actual number of rejects is used in the calculation. The firm’s goal for Quality from suppliers is “0”DRM. The Supplier Quality Engineer shall monitor these performance indices for compliance and take appropriate action. Suppliers have to meet delivery requirements of the firm purchasing. Delivery timing requirements are indicated on the releases. On-time delivery (in acceptable range) is measured by the number of shipments received per the firm release requirements for parts and then calculated a percentage. The firm expects 100 % “On -Time” delivery from all suppliers. Supplier Performance may be assessed by tracking the total number of quality defects occurred through 12-month period. A completed corrective action request having supporting documentation verifying corrective action must be communicated to the firm Supplier Quality Engineering within two weeks of the original notification date. If additional time is required by supplier for root-cause and implementation of corrective actions, supplier should contact the firm Supplier Quality Engineering to extent the due date. Supplier may be required to complete and return the firm’s supplier self-assessment form for the firm’s review that may be followed by an on-site survey. Any deficiencies must be addressed by a timely corrective action plan. Before Approved status is granted.

All new suppliers shall:

- Review the Supplier Quality Assurance Manual requirements, complete and return the Agreement Form in less than two weeks after receipt

- Complete the firm Supplier Assessment Form, in less than three weeks after receipt.

Note: A new supplier that has not provided production material used in production and price will be issued a 30 day temporary approval. A supplier of production material, prototypematerial, and/or custom tooling must be obtained.

The assessment results in classifying a supplier as:

- Acceptable for purchase (Receiving 80 % grade or greater without any non-compliance)
- Conditional for purchase (Receiving 50 % grade or greater with fewer non-compliances)
- Non-acceptable (disqualified): A minimum rating of “Approved” status is necessary to be considered for future programs with suppliers.

5. Conclusions

This rating procedure with a different category can be used for European suppliers. There will be a more strict competition among suppliers. It is easier to communicate with these suppliers and getting short-term benefits in short time. The cost optimization of suppliers can be carried out by the team of the firm and their costs can be decreased. The cost reduction is a part of evaluation suppliers and outstanding suppliers should be awarded with new projects to gain economic benefits. In the same way, Asian suppliers should be awarded. Reaching raw materials is not that much easy for European suppliers but they have a good technology and they can produce qualified products. Their outstanding part is their technology and developing quality. But some of their products have been taken from them and given to Asian suppliers to produce at cheaper cost. They are in threat of losing more parts. Supplier's integration with whole firm is another crucial part for the firm to extend its operations. In case, there is any problem with related department they can get into contact directly.

After all evaluations, SWOT (Strength-Weakness-Opportunities-Threats) Analysis can be used to make overall conclusion. It will help the manager of the firm to understand the whole Picture of supplier. The concentration should be on strength and weakness of suppliers. A supplier award certificate will recognize supplier meeting the firm standards for outstanding grade.

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