

Accessing and mitigating various Risks involved in Supply Chain

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Abstract- In Every automobile company, supply chain is quite widespread and there is a long chain of agencies involved in it starting from Raw material manufacturer to end customers. There is a hub of various type of suppliers involved in supply chain. Nature of each supplier is different, the commodities they supply is different. Every OEM (Original Equipment manufacturing) company has to manage different categories of suppliers. When multiple agencies are involved in any manufacturing then there are very high chances that any of the agency may create some issue and hamper smooth functioning of the complete supply chain. In such situation it becomes quite important for any OEM to have strong supply chain and access all risks related to supplies well in advance. Suppliers may create issues which ultimately affects the final production line at Supply chain. So in such case Risk identification and timely mitigation of them is of utmost importance.

I. INTRODUCTION

During the last twenty- odd years, supply chain management practices have evolved towards more lean process approach in order to reduce waste with in overall supply chain. Concepts such as just in time, lean inventory, supplier rationalization, outsourcing and best in class cost reduction techniques and methods have reduced total supply chain costs, but the result has been increased risk. Tradeoffs between achieving optimal supply chain efficiencies and management of supply chain risks have created a sort of conundrum and made Supply Chain more vulnerable.

Now let's talk of some risks that have actually impacted many automobile industries in the world. On March 11, 200, in early afternoon, Japan was rocked by 9.0 magnitude earthquake that caused widespread damage to the country's eastern coastal region .The Tsunami that followed the earthquake has devastated most of the eastern coastal regions of Japan.

An incident of Fukushima Nuclear power plant was also reported. Automobile companies were not able to get the components timely for final assembly at production lines.

A similar incidence of flooding in Thailand occurred in July 2011 which again impacted smooth flow of supply chain.

Sometimes fire issues are observed in supplier locations, it also impacts the production lines. Water logging at production areas hampers production.

At some places there are industrial strikes and IR issues which again impacts production and manufacturing process.

All strategies of manufacturing companies and planning got haywire due to all of the unprecedented risks and left firms with no alternate, but war footing and reactive countermeasures. All these happened due to:

- Optimized and lean supply chain
- Increased globalization through outsourcing
- Shorter product lifecycles

But for long term, this war footing approach is not at all advised and there appears a need to have structure approach to access risks associated with supply chain and search reasons well in advance to mitigate risks.

II. OBJECTIVES

Every automobile company must have structured risk management procedure. Standard metrics and their understanding amongst all supply chain members must be established to ensure identification of risks, much before they become "evident" in place.

Standard definitions and templates must be prepared for all risks associated with production line due to supply chain elements. Organization, processes and system requirements must be clearly defined.

III. THEORY

Supplier risks are broadly categorized under three heads. The heads are summarized as:-

- 1) Financial risks
- 2) Operational Risks
- 3) Location Risks

Each risk stated above has further sub heads and based on duly formed structured check sheet responses can be collected from suppliers and categorized as Red, Yellow and Green to convert qualitative data into quantitative data.

Financial Risk is further categorized into:

- a) Liquidity
- b) Funding
- c) Profitability

Based on answers collected from suppliers heads can be categorized as per defined colors. For explaining, responses collected are shown as Bold and underlined.

For Liquidity:

Question	Answer1(Red)	Answer2(Yellow)	Answer3(Green)
No. of times vendor has received working capital funds from OEM in last 24 months?	If ≥ 2	If 1 time	If 0 time
Interest coverage ratio (PBIT/Finance charges)	< 1.25	If 1.25 to 1.99	If > 2
Employees paid in time? (in weeks)	> 1 month delay	Between 2 week to 1 month delay	< Less than 2 week
Tier 2/3 vendors paid in time? (in months)	Tier 2/3 vendor has complained to OEM or > 3 month delay	Between 2 to 3 months	$<$ Less than 2 month

For Funding:-

Question	Answer1 (Red)	Answer2 (Yellow)	Answer3 (Green)
No. of times vendor has received working capital funds from OEM in last 24 months?	If ≥ 2	If 1 time	If 0 time
Current ratio (Current assets/Current liabilities)	If < 0.8	If 0.8 to 1	If > 1
Adequate FG inventory maintained? Calculate (actual/expected inventory) in %	If $< 75\%$	If 75% to 100%	If 100%

For Profitability:-

Question	Answer1 (Red)	Answer2 (Yellow)	Answer3 (Green)
Net forex exposure as a % of total revenue	If $> 50\%$	If 20% to 50%	If $< 20\%$
Cumulative spike in input cost over last 12 months	If $> 15\%$ spike	If 10% to 15%	If $< 10\%$
Average ROCE for the last three years	If $< 6\%$	If 6% to 13%	If $> 13\%$

Operational Risk is categorized into:-

- a) Management
- b) Tier 2/3

- c) Safety
- d) Labor
- e) Performance
- f) Power
- g) Machinery

For Management:-

<u>Question</u>	<u>Answer1 (Red)</u>	<u>Answer2 (Yellow)</u>	<u>Answer3 (Green)</u>
Management change expected (next 12 months) / occurred (last 6 months)	Change is expected / has happened and is negative for OEM	Change is expected / has happened and is neutral for OEM	No change is expected / has happened or positive change
Management conflict in last 1 year	Yes and issue not resolved	Yes and issue resolved	No management conflict
Is there a succession plan in place?	No	-	Yes
Are there sufficient number of managers to run the business?	-	No	Yes

For Tier 2:-

<u>Question</u>	<u>Answer1 (Red)</u>	<u>Answer2 (Yellow)</u>	<u>Answer3 (Green)</u>
Is there any critical Tier2 content?	-	Yes	
Is there process maturity at Tier1 Answer the following for the Tier 1 supplier 1. Does the vendor follow Q & D rating system? 2. Are quality defects in critical child parts observed at OEM within permissible limits? Were more than one Quality problem reports filed for any child part of the component in the last 6 months? 3. Does the vendor carry audits on its vendors?			Yes to all questions

For Safety:-

<u>Question</u>	<u>Answer1 (Red)</u>	<u>Answer2 (Yellow)</u>	<u>Answer3 (Green)</u>
Has any major safety accident happened in the last 1 year?	Yes	Yes but countermeasure already taken	No
PPE used by all employees	If hazardous industry and no PPE usage as per the norms	If low PPE norms adherence	If normal operations and PPE usage is as per the norms
Is vendor prone to fire risk?	Adequate fire safety measures are not present	Fire prone industry but adequate safety measures present	Adequate fire safety measures are present

For Labor:-

Question	Answer1 (Red)	Answer2 (Yellow)	Answer3 (Green)
Disruptions due to labor unrest in the last 24 months?	If issue unresolved	If issue resolved	No major disruption
Is IR contract finalization delayed or expected expiry in next quarter?	IR contract finalization delayed by > 3 months	IR contract expiry in next quarter or contract finalization delayed by 13 months	IR contract settled or no delay
Affiliation of labor union?	-	External	Internal or no union
Difference in wages and incentives of permanent and contract employees for similar work (only if % contract workers >50%)	Same work, pay difference > 70%	Pay difference 35-70%	Pay difference < 35%

For Performance:-

<u>Question</u>	<u>Answer1 (Red)</u>	<u>Answer2 (Yellow)</u>	<u>Answer3 (Green)</u>
Number of dips in quality rating over last six months	If 4 or greater dips (-5% drop)	If 2 to 3 dips	If 0-1 dip
Number of dips in delivery rating over last six months	If 4 or greater dips (-5% drop)	If 2 to 3 dips	If 0-1 dip
Absolute quality rating	If < 500	If 500 to 605	If > 605
Absolute delivery rating	If < 225	If 225 to 290	Greater than 290

Marks are on scale of 0 to 1000.

For Power:-

Question	Answer1 (Red)	Answer2 (Yellow)	Answer3 (Green)
Is there 100% power backup?	-	-	Yes
State / region power situation	Greater than 4 hour power cuts daily	Up to 4 hour power cuts daily	Less than 1 hour power cuts daily

For Machinery:-

Question	Answer1 (Red)	Answer2 (Yellow)	Answer3 (Green)
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Does the vendor run more than 2 shifts (or > 16 hours) for any process / operation related to this component?	-	Yes	No
Is m/c preventive maintenance followed?	If no preventive maintenance planning exist	If preventive maintenance plan exist, however compliance is < 75%	If preventive maintenance plan exists and compliance is > 75%
What is the vendor's OEE (Overall Equipment Effectiveness)?	If < 75%	If 75% to 85%	If > 85%

Location Risks comprises of the factors mentioned in table below:

<u>Question</u>	<u>Answer1 (Red)</u>	<u>Answer2 (Yellow)</u>	<u>Answer3 (Green)</u>
Is the vendor operating out of a risky country? (eg. China)	-	Yes	No
Number of days of supply disruptions due to strikes, bandhs, riots etc. in last year	If > 7 Days	If 2 to 7 Days	If <2 Days
Seismic, cyclone, tsunami, flooding zone score	Red	Yellow	Green
Does the vendor operate in a regulated industry?	-	Yes	No

IV. CONCLUSION:-

Based on above analysis any OEM can easily understand the overall situation of Supplier Company and accordingly corrective/preventive measures can be taken to avoid foreseen risks.

V. RESULTS:-

- Reduced Risk Impact
- Instead of reacting to crises OEM will be predicting and eliminating risks timely.
- Having control on supply chain volatility

VI. FUTURE SCOPE:-

IT enabled dashboard can be created and a count can be decided for number of questions. If in particular category there are 10 questions and supplier is found green in more than 8 questions then rating of supplier must be green. If supplier has yellow rating in 4 to 7 questions then final score must be yellow and if less than 4 then rating of supplier is red.

REFERENCES

- [1] Christopher, M. and Peck, H (2015) "Building the Resilient Supply Chain", International Journal of Logistics Management Vol. 15, No. 2, pp 1-13
- [2] Christopher, M. and Holweg, M. (2014) "Supply Chain 2.0: Managing Supply Chains in the Era of Turbulence" International Journal of Physical Distribution and Logistics Management Vol. 41, Nol. 1, pp 63-82
- [3] Christopher, M. (2018) Logistics and Supply Chain Management (5th Edition) Pearson.
- [4] Christopher, M. (1992) Logistics and Supply Chain Management: Strategies for Reducing Costs and Improving Services Pitman Publishing.
- [5] Chopra, S. and M.S. Sodhi (2014) "Reducing the Risk of Supply Chain Disruptions" MIT Sloan Management Review Spring, pp 73-80.
- [6] Juttner, U., H. Peck and Christopher, M. (2003) "Supply Chain Risk Management: Outlining an agenda for future research" International Journal of Logistics: Research Applications Vol. 15, No. 2, pp 197-210
- [7] Mena, C., R. van Hoek and M. Christopher (2014) Leading Procurement Strategy Kogan Page.
- [8] Sheffi, Y. and J.B. Rice (2005) "A Supply Chain View of the Resilient Enterprise" MIT Sloan Management Review Vol. 47, No. 1, pp 41-48.
- [9] Ali, H. Z., Abdul, R. I., V.G.R. Chandran, & Veera Pandiyan, K. S. (2010). Supply chain integration: An empirical study on manufacturing industry in malaysia. Journal of Systems and Information Technology, 12(3), 210-221
- [10] Blackhurst, J. V., Scheibe, K. P., & Johnson, D. J. (2008). Supplier risk assessment and monitoring for the automotive industry. International Journal of Physical Distribution & Logistics Management, 38(2), 143-165
- [11] Cernauskas, D., & Tarantino, A. (2009). Operational risk management with process control and business process modeling. The Journal of Operational Risk, volume 4 number 2, P: 3-17.

- [12] Geisler, J. E. (2014). Improving product design through the use of design failure mode and effects analysis. Available from ProQuest Dissertations & Theses Global.
- [13] Kessinger, C., & McMorrow, J. (2012). Supply Chain Risk Management: A Perspective from Practice. In P. Kouvelis, L. Dong, O. Boyabatli & R. Li (Eds.), *The Handbook of Integrated Risk Management in Global Supply Chains*. Hoboken, NJ: John Wiley & Sons.
- [14] Souza, R., Mark, G., Maya, K., Jason, C. (2017). Combating Supply Chain Disruptions: Lessons Learned from Japan. Report. National University of Singapore

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