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To Investigate Some Critical Risk Factors in Supply Chain Management

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Abstract- SCM is a cross-function approach including managing the movement of raw materials into an organization, certain aspects of the internal processing of materials into finished goods ,and the movement of finished goods out of the organization and toward the end-consumer. The prime objective of this study is to Study of critical risk factors in SCM and To examine the effectuation of cost in SCM. The role of various critical risk factors in the manufacturing productivity in the organizations is also analyzed. . The literature review has indicated that there is less use critical risk factors in the small scale industries. In this study, initiative has been taken to implement the various risk factors in the manufacturing industries. After identification of the rese arch gaps, the objectives of the study are formulated. This analysis yielded some useful results which are implemented to improve the existing processes.

Keywords:- SCM, Critical risk factors, Small scale industries, Manufacturing industries, Productivity, Effectuation of cost , End-consumer, Finished goods.

I. INTRODUCTION

Supply Chain Management (SCM) is defined as the design, planning, execution, control and monitoring of supply chain activities with the objective of creating net value, building a competitive infrastructure, leveraging worldwide logistics, synchronizing supply with demand and measuring performance globally. It includes the coordination and collaboration of processes and activities across different functions such as marketing, sales, production, product design, procurement, logistics, finance, and information technology within the network of organizations (Flores Myrna et al., 2009).

Supply chain management takes into consideration every facility that has an impact on cost and plays a role in making the product conform to customer requirements: from supplier and manufacturing facil ities through warehouses and distribution centers to retailers and stores. Indeed, in some supply chain analysis, it is necessary to account for the suppliers' suppliers and the customers' customers because they have an impact on chain performance. A typical supply chain may involve a variety of stages.

These supply chain stages include:

- Customers
- Retailers
- Wholesalers/Distributors
- Manufacturers
- Component/Raw material supplier
- Supply Chain Management Models
- Competitive priorities and manufacturing strategy

The ability of a supply chain to compete based on cost, quality, time, flexibility, and new products is shaped by the strategic focus of the supply chain members. A firm's position on the competitive priorities is determined by its four long-term structural decisions: facility, capacity, technology, and vertical integration, as well as by its four infrastructural decisions, workforce, quality, production planning and control, and organization. The cumulative impact of infrastructural decisions on a firm's competitive- ness is as important as long-term structural decisions.

1.Efficient supply chain and responsive supply chain:

One of the causes of supply chain failure is due to the lack of understanding of the nature of demand. The lack of understanding often leads mismatched supply chain design. There are two distinctive approaches, efficient supply chain and responsive supply chain, to design a firm's supply chain.

The purpose of responsive supply chain is to react quickly to market demand. This supply chain model best suites the environment in which demand predictability is low, forecasting error is high, product life cycle is short, new product introductions are frequent, and product variety is high. The responsive supply chain design matches competitive priority emphas izing on quick reaction time, development speed, fast delivery times, customization, and volume flexibility. The design features of responsive supply chains include flexible or intermediate flows, high-capacity cushions, low inventory levels, and short cycle time.

2. Clock-speed of product, process, and organization life cycles:
Each industry evolves at a different rate, depending in some way on its product clock- speed, process clock-speed, and organization clock-speed. For example, information entertainment industry is one of the fast-clock- speed industries. Motion pictures can have product life measured in hours. Christmas time is the best season to introduce new movies when the number of viewers is greatest. The process for inform ation-entertainment industry changes rapidly. New processes for delivering information entertainment products and services to our home, public centers, and offices evolve daily. CD players, DVD are just a couple of examples.

Organization structure is dynamic as well. Relationship among media giants such as Time-Warner, Disney, and Viacom are negotiated, signed, and re-negotiated constantly to accommodate the changes in product and process design. Somewhere in the middle is automobile industry. The product does not change as fast as information-entertainment industry nor does it as slow as aircraft industry.

2. LITERATURE REVIEW

Wang et al.(2020) presented a supply chain finance adoption model to investigate the key drivers and corresponding outcomes of supply chain finance adoption decisions. We examine the impacts of perceived capital pressure, order fulfillment cycle, and inventory turnover cycle on three types of supply chain finance adoption (accounts receivable finance, inventory finance, accounts payable finance). In addition, we examine the impacts of three types supply chain finance adoption on the performance of supply chain cost reduction. We use data collected from 683 companies of eight industries in China to test our proposed relationships.

Chang et al. (2020) presented define the critical risk factors that influence the governance of enterprise internal control in an IoT environment, and(2) classify the risk factors and study their importance in such an environment. The study uses Gowin's Vee knowledge map as a research strategy to mitigate the limitations of qualitative research through a set of strict research procedures. In addition, the Delphi method is used to test and provide feedback to justify and revise the critical risk factors.

Singh et al. (2020) presented Increasingly, creating and delivering value through complex supply chain networks involves substantial risks. However, strategy development under business risk conditions is not well-understood. This cross country research examines how, under conditions of supply chain network risk, firms develop effective risk management practices. Using a literature review and survey research of man agers from global firms. we present a research model, and empirically test the hypothesized relationships.

Singh et al. (2020) presented the significance of green supply chain management (GSCM) to study the impact lean practices, namely, Kaizen and innovation management practices on organizational sustainability. The subject of green supply chains attracts a growing interest in academic and professional literature since 1990.

Orji, Ifeyinwaet al.(2020) presented investigation of the significant factors that influence corporate decisions on the use of social media for supply chain social sustainability, and it highlights a crucial research area that is currently understudied in supply chain management literature. A theoretical framework was developed in this study based upon the Techno logy–Organization–Environment(TOE)and Human organization Technology(HOT)theories to obtain the significant critical success factors(CSFs)which influence the use of social media for supply chain social sustainability in freight logistics firms in Nigeria.

Chowdhury et al. (2019) presented potential supply chain risks and analyzes the interactions. To achieve this, a hierarchical structural model was developed through the application of an interpretive structural modeling(ISM)approach. Moreover, MICMAC (Matriced' Impacts Cruoses Multiplication Applique a un Classement) analysis was conducted to classify the risks based on driving and dependence power. Findings revealed that disruption risk was the most influential risk in the RMG industry.

Cousins et al. (2019) presented the moderating effects of two practices unique to sustainable supply chain ecocentricity and supply chain traceability–on a firm's environmental and operating cost perform ance. The results suggest that green supply chain management (GSCM) practices are associated with improvements in both environmental and cost-based performance.

III. RESEARCH METHODOLOGY

1. Research Plan:

In this study, initiative has been taken to implement the various risk factors in the manufacturing industries. After identification of the research gaps, the objectives of the study are formulated. This analysis yielded some useful results which are implemented to improve the existing processes.

2. Research Purpose:

Implementing supply chain risk management has been troubleshooting in many organizations. In pract ice assessing risk management in supply chain is rather under-developed and often dealt with infor mal and reactive manner.

The purpose is also to describe and analyze the various risk factors that contribute to the successful/ unsuccessful supply chain systems.

3. Research Approach:

The research presented here is specifically targeted to manufacturing organizations which are managing the supply chain operations. This research deals with the risk issues and thus empirically assesses which risk factors are most influencing one in supply chain operations which must be given careful attention.

The manner of the research approach chosen for this study is of a qualitative nature, where data collection consists of thorough literature review and studying case studies.

IV. RESULT AND DISCUSSION

This article is based on a project proposal submitted for balancing a company's production line. It focuses on a solution for a production line with a relatively simple structure. For a given set of operations, the classical line balancing problem consists of assigning each operation to a workstation to minimize the number of workstations and satisfy precedence constraints. The balance delay time will be minimal if and only if the numbers of workstations are minimal too. The dual problem is minimization of the cycle time for the given number of workstations. The experiment was conducted at India, which has a strong manufacturing base in bi-metallic bearings backed by testing and R&D facilities.

1. Existing System–Before Rearranging:

This section considers the data in the conventional line of production. In the present assembly line, the production of bearings is already productive and optimistic, but this study aims for much better results. To prepare a balanced assembly line, it is necessary to collect certain data from various sources, including production volume, list of operations in sequence, and time duration required for each operation.

Table 1. Production requirement of all five assembly lines.

Production Line	Transfer line 1	Transfer line 1	Transfer line 1	Conventional line	Safety stock line	Trans fer line 1
Production requirement	420,260	378,600	418,987	221,520	36,950	420,260

2. Present List of Operations in Sequence:

The sequence of operations plays a key role in the production process.

The following process described below is continuous:

Line of operations in conventional assembly line;

- Blanking
- Forming
- Facing
- Chamfering
- Notching
- Piercing
- Oil grooving
- Reaming
- Parting line shaving
- Crush height measuring
- Boring

3. Takt Time Calculation for Total Production:

The takt time is calculated by dividing the available working time per shift (in seconds) by the customer demand rate per shift (in units).

Takt Time= Available Work Time/Day / Customer Demand/Day
= 1 sec per bearing

Refer to Appendix2 for the calculations. The takt time taken for the production ofa single bearing is around one second (1sec) (refer too Appendix A2). Phrased another way, a bearing is produced or manufactured every single second.

4. Takt Time Calculation for Conventional Line:

The takt time was calculated for total production, which means that it includes all the production lines as discussed earlier. We will calculate takt time for the conventional line only as our line balancing concept applies to the line; we cannot apply balancing for automated lines.

Takt Time of the Conventional Line= 6.61 sec per bearing

5. Idle Time Calculations:

Table 2. Calculations and production rate for the conventional line rearranging.

S.No.	Operation	No. of parts/hours	Cycle Time (in sec)	Idle Time (in sec)
1	Blanking	3580	1.0	0.0
2	Forming	3580	1.0	0.6
3	Facing	2250	1.6	1.0
4	Chamfering	1405	2.6	0.0
5	Notching	1380	2.6	0.6
6	Piercing	1090	3.2	0.5
7	Oil Grooving	975	3.7	1.5
8	Reaming	700	5.2	1.8
9	Parting Line SHAVING	1060	3.4	1.2
10	Crush HeightMeasuring	1635	2.2	1.3
11	Boring	1060	3.5	0.0
	Total	–	30.0	8.5

Table 3. Comparison of the results of the two methods.

S.No.	Operation	Cycle Time (in sec)	Idle Time (in sec)
1	Blanking	1.0	0.0
2	Forming	1.0	0.6
3	Facing	1.6	1.0
4	Chamfering	2.6	0.0
5	Notching	2.6	0.6
6	Piercing	3.2	0.5
7	Oil Grooving	3.7	1.5
8	Reaming	5.2	1.8
9	Parting Line SHAVING	3.4	1.2
10	Boring	3.5	0.1

11	Crush Height Measuring	2.2	1.3
	Total	30.0	7.4

Table 4. Comparison of the results of the two methods.

S.No.	Consideration	Before Arranging	After Arranging
1	No.of work stations	11	6
2	Manpower requirement	13	6
3	Cycle Time(in Sec)	30.00	30.00
4	Takt Time (inSec)	8.5	6.61
5	Productio n of Bearings	6061	8206

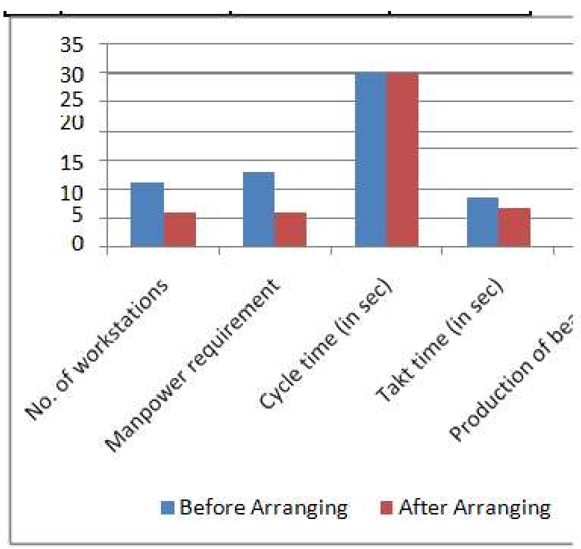

Fig 1. Comparison of the results of the two methods.

V. CONCLUSION

The data for the time and motion study, including cycle time, production commitment, and production requirement, were collected from the com pany. After restructuring the process flow, we could observe appreciable increase in production. Using Timer Pro Professional software, the line balancing was carried out and the optimized number of workstations and operators were obtained based on takt time and production requirement, which gave the most optimized results. Timer Pro Professional optimized the line efficiency and workstation utilization, which led to the suggested grouping of workstations to implement pragmatically to proliferate the production volume. A simulated result does not exactly replicate in a practical situation, but it approximately indicates an optimum value that the manufacturing company should consider for productivity. A suggestion was given to the industry about our work both by rearranging the production operation to increase the assembly line efficiency, which is practically implementable to make the company's product cost effective and competitive in the market.

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