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An Empirical Study of Operations Risk Management in Small and Medium Enterprises in India

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Abstract: Production risk Management is vital for an enterprise and when done efficiently it can reduce a lot of calamity. The lesser the risk involved in a production process, the greater the efficiency in producing the product. In this study twenty five different issues were surveyed in 72 different companies. The twenty five issues were grouped into five different constructs and each issue were given a minimum value of one and a maximum value of five with 5 being very good and 1 being very bad. The results were astonishing and it seemed that effective Production risk management has a positive influence on the efficiency of production of a product. Production risk is a relatively new and burgeoning commodity in the field of research though there may have been few studies in the past.This research is focused on identification of operations risk factors and analysing the relationship between the factors and supply chain performance. This empirical study is done on SME in and around Chennai.

Key words: Supply Chain Management (SCM) · Supply Chain Performance (SCP) · Small and Medium Enterprise (SME) · Production risk (PR) · Production risk management (PRM)

INTRODUCTION

The modern world categorises industries based on the number of personnel employed in a particular industry. Industries in which the number of employees and labours fall below a certain limit are known as Small and Medium Enterprises. The limit is not a rigidly fixed value but a range which may vary globally. The abbreviation SME is used in the European Union and by a number of other international organisations such as the World Bank, The United Nation and the WTO. When it comes to the battle of the number of SME's to the number of large industries, the SME's win hands down. As only minimum number of employees are required to start an SME, many SME's are being setup across the planet. Over the last five decades SME's in India have been ever-growing and they have created a market for themselves. The fierce competition among the various SME's has created the requirement for more and more innovation. The Indian government has been encouraging the growth and development of the SME's right from the beginning and has been central to the flourishing of the Small and Medium Enterprises in India. In India, the SME Sector contributes about 8% to the nation's GDP besides 45% to the total manufacturing output and 40% to the exports in the country with more than 6000 products. SME's thrive on innovation and this craving for creativity improves the Company's revenue which influences the Gross Domestic Product and directly affects the economy of the company. With all the positives nearly camouflaging the negatives, the risks involved in the functioning of the SME is often overlooked. SME's face day to day challenges just like any large scale industry. The hindrances include capital shortages, skill shortages and turbulent market scenario and many others. These problems must be handled carefully by laying emphasis on risk management. A company giving more importance to risks and assessing it precisely will do much better in the market compared to its competitor. These risks must be perceived and nullified much earlier than the impact starts to show up.

Literature Review: Tazelaar and snijders (2013) dealt with the difference in risk assessment and perception by more and less experienced professionals. This is what they took

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to calling the "process-performance paradox".They concluded that expertise has pretty much no impact on performance. Be it a veteran or a fledgling the impact on the result and the net effect is zero.

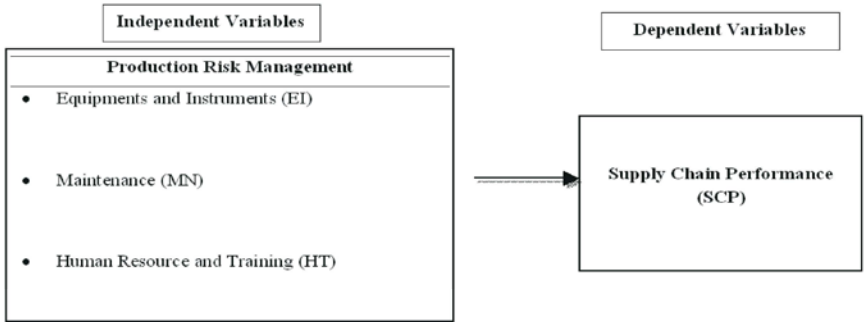
Manmohan sodhi and Son (2015) provided analyst reports about the secondary information based on the information gathered by analysts by diverse sources including the top management. This is useful in explaining financial and stock performance in the recent past. They conducted three types of analysis Frequency analysis, cluster analytics, logistics regression. From their findings they were able to decipher the existing information symmetry between shareholders and managers. E.Bendoly *et al*. (2005) developed a framework for identifying the types of behavioural assumptions typically made in analytical operations management models.

Drake and Spindler's (2013) goal was to mainly debate whether the sustainable operations management is an enduring stream or a passing fancy. They questioned the stream's ability to endure. They conducted a ground-breaking survey and the result obtained was positive. Any firms operating management decision will determine the technology that they will employ and the design of their production and distribution systems.

Yacov *et al*. (2001) threw light upon risk assessment and risk management in the modern scenario. They explained a framework for risk analysis and how to deal with risk in potentially hazardous situations. A number of approaches were followed including

- Fault tree analysis
- Hierarchical multi objective trade-off analysis

Dane and Pratt (2007) have emphasised throughout this paper how intuition is viewed as a potential means of helping managers make both fast and accurate decisions in organisations. The major discussion is about how and why speed serves as a characteristic of intuition and identified factors that make intuitive judgements effective in decision making. Barush Fisschoff *et al*. (1984) and Chris Hope were keen on defining the term 'risk' and give it an explicit meaning. However, they realized they cannot arrive at the meaning through a linear approach as the term was innately disputable and a universal definition cannot be given to it. Eric J. Johnson and Amos Trversky *et al*. (1983) in the course of this journal lay emphasis on how people's reactions to risks and interpretation of hazards often help in the shaping, regulation and assessment of miscellaneous technologies. In most cases, when we do not have adequate information to enumerate the risk pertaining to a particular technology, the determination of risk becomes intuitive than objective. Fishburn *et al*. (1997) in his paper attempts to address the classical complexity of risk versus returns in case of different types of investments and their probable outcomes. Peter C Fishburn has come up with a class of model known as alpha- t model which claims to have high computational efficiency and accuracy for making decisions. The alpha –t model measures the risks and is defined by two parametric functions. Jason Scott Johnson *et al*. (2002) makes an attempt to explain the paradoxical behaviour of the United States society towards taking risks. While explaining this paradox he makes an assumption that people's response would be rational towards long term changes brought about by USA government in taking care of the social safety of the people by improvements in medical care and treatments. Kleindorfer *et al*. (2003) gives us the risk management strategies needed to alleviate the impacts of the low probability high consequence risks. This however is subject to future research. He also worked on the risk management strategies in supply chain management. His view was that hp-lc (high probability low consequence) risks are ubiquitous in supply chain management. The results were breath-taking as it showed a vast amount of difference with respect to risk consequence between medium and large enterprises.



Conceptual Model and Framework: A brief description of the constructs of Production Risk (PR) management.

Equipment and Instruments (EI): The careful maintenance of equipment and instruments is vital to the production process. A huge cost will be incurred if there is any machine failure which will deter the profit percentage. If the machines are working sanely, it is also a huge time and money saver. When there is a failure of equipment, it can be damaging to the labourers too [10].

Maintenance (MN): Maintenance includes preventive maintenance, autonomous maintenance, spares management and other regular maintenance. Diligent overall maintenance is essential for an SME. [3, 4].

Human Resource and Training (HT): Effective communication of information from the senior level managers to medieval managers and from medieval managers to labourers is important. Training of the labourers in the right way and extracting maximum output from them is necessary. [14], [20].

Quality Management (QM): Quality management epitomises the firm on the whole, attracts customers and strengthens the supply chain. Today's world is driven by quality and precision. Effective quality management is a characteristic of a good SME. [17], [21]

Production Process Control (PC): Systematic planning and execution of the plan is a must for a firm. The process flow should be watched from underneath the eye as intricate mistakes can impact the outcome drastically. The many processes of production needs meticulous control. [16], [18]

Supply Chain Performance (SP): Supply chain is nothing but the flow of goods and services through the company. The intake of raw materials in to the inventory, the processes and the outsourcing all come under supply chain. The above five constructs affect the supply chain performance [19].

Research Hypotheses: Research hypotheses were framed on the bases of the conceptual model. These hypotheses were developed to find the relationship between the constructs of SCM and the SCP.The observation leads us to four hypotheses which are given below,

Table 2: The List of formulated Hypotheses

H1	There is significant difference between the Constructs
H2	There is a significant influence of QT on SCP
H3	There is a significant influence of PC on SCP
H4	There significant influence of CA and SCP

Questionnaire Development

Reliability and Validation Test: Reliability is the extent to which the instrument measures the intended issue consistently. In this method, reliability is seen as internal consistency, which is the degree of inter correlations among the items that constitute a scale. A measure is often considered to have face validity if the object or item are agreeably related to the purpose of the measure [22].When a measure connect well with the other measures that are believed to measure the same construct, convergent validity is obtained[23]. In this study all the values are under acceptable levels displaying both reliability and convergent validity

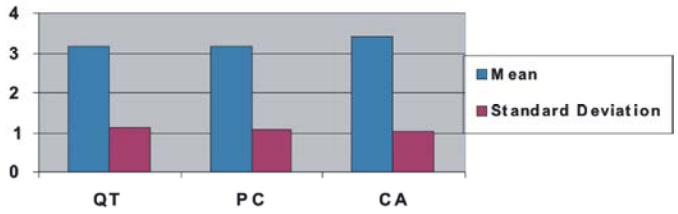
Data Collection: With a specific end goal to capture the affects of the risks in the overall performance of the firm, A questioner was developed in view of a comprehensive survey of the Literature (prescriptive, theoretical, experimental and professional). A five-point Likert scale (with 1 specifying 'low' and 5 designating 'high') has been framed. The Questioner was circulated to one hundred and ten experts from both scholastics and managers from firms, from which fifty one response were considered. Based on the suggestions from the specialists, changes (as far as the evacuation of excess things and in the wordings of the things) have been suitably done.

Data Analysis

Descriptive Analysis:

Constructs	Item No.	Mean	Standard Deviation
Equipments and	1	2.68	0.79
Instruments (EI)	2	3.9	1.11
	3	3.43	1.24
	4	3.4	0.85
		3.85	0.92

Maintenance (MN)	1	3.4	1.01
	2	3.1	1.18
	3	3.2	1.05
	4	3.55	0.92
Human Resource	1	4.06	0.77
and Training (HT)	2	3.48	1.25
	3	2.91	0.94
Quality Management (QM)	1	3.05	1.08
	2	3.58	1.25
	3	3.93	0.98
	4	2.1	0.817
	5	3.21	1.02
Production Process	1	3.18	1.06
Control (PPC)	2	2.73	1.07
	3	2.81	1.26
	4	2.75	1.15
	5	2.81	1.34
	6	3.28	1.12
	7	3.41	0.8
	8	3.51	0.81



Descriptive Statistics for Dependent Variable: The descriptive statistics of each items of SCP is displayed in the form of mean and standard deviation are shown in Table 1.

Construct	Item no.	Mean	Standard Deviation
	1	3.06	1.11
Supply Chain Performance (SCP)	2	2.68	1.17
	3	2.45	1.06
	4	2.55	1.32
	5	2.86	0.96
	6	3.23	0.85

Correlation Analysis:

	EI	MN	HT	QM	PC	SCP
EI	1					
MN	0.765	1				
HT	0.657	0.562	1			
QM	0.527	0.611	0.422	1		
PC	0.257	0.312	0.386	0.417	1	
SCP	0.135	0.153	0.108	0.297	0.813	1

`	Items	Factor Loading	Eliminated Items	Cronbach's	F	P
EI	EI1	0.704	EI2	0.637	15.278	0
	EI3	0.934				
	EI4	0.618				
	EI5	0.909				
MN	MN1	0.843	NIL	0.562	2.767	0.043
	MN2	0.801				
	MN3	0.832				
	MN4	0.73				

HT	HT1	0.914	NIL	0.775	41.56	0
	HT2	0.829				
	HT3	0.802				
QM	QM1	0.819	QM3	0.505	28.73	0
	QM2	0.657				
	QM4	0.72				
	QM5	0.903				
PC	PC1	0.822	PC7,PC8	0.861	8.305	0
	PC2	0.775				
	PC3	0.861				
	PC4	0.654				
	PC5	0.868				
	PC6	0.801				
SCP	SP1	0.871	SP3,SP4,SP5	0.554	5.605	0
	SP2	0.818				
	SP6	0.846				

Regressional Analysis: The regression model is formulated such a way that EI, MN,HT,QM and PC as an IVs and SCP as DV. The relationship was analysed and represented as an Eq. 1. The outcome of ANOVA are represented as the value of $p < 0.000$,F=52.024, R2 value is 0.828 and Adj.R2 value is 0.812 are proving that the model is fit.

$$SCP = 0.229 - 0.135\ EI - 0.153\ MN + 0.108\ HT + 0.247\ QM + 0.813\ PC \quad (1)$$

FINDINGS AND CONCLUSION

The objective of the research is to identify the OR factors with respective items and analysis of relationship between the factors and measure of performance by formulating hypothesis. The regression analysis confirming that the hypothesis H3 and H5 are more significant and MN and QM are more influencing factors to improve the SCP. The H2, H4, H6are not significant and proved that there is less influence of EI, HT, PC on SCP. The correlation analysis is proved that the H1 is significant and there is a moderate difference between the factors. This research concludes that maintenance and quality management are most essential factors to improve the supply chain performance or SME performance.

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